INDIAN MEDICINAL PLANTS

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By

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INDIAN MEDICINAL PLANTS

PHANEROGAMIA.

ASCLEPIADACEAE.

Herbs or shrubs frequently twining, often with milky juice. Leaves opposite or whorled, rarely alternate (absent in Sarcostemma), entire; stipules 0. Flowers hermaphrodite, regular, solitary or few or many together, in umbels, umbellate cymes, fascicles or racemes, axillary, lateral (between the bases of the leaves) or terminal. Calyx inferior, usually divided to the base or nearly so; segments imbricate, usually with minute processes or glands at the base inside. Corolla various, hypogynous, gamopetalous, 5-lobed; tube usually short (long in Ceropegia), often furnished within or at its mouth with a ring of scales or processes (corolline corona); lobes imbricate, contorted or valvate in aestivation, often recurved or connate at their tips. Stamens 5, inserted at or near the base of the corolla and alternating with its lobes; filaments rarely free, usually connate into a fleshy tube (staminal column), with its apex often united to the dilated part of the style, usually with fleshy scales or processes on the back (staminal corona); anthers free or united to the dilated part of the style, 2-celled, the margins of the anthers or their basal prolongations below the cells more or less horny and wing-like (anther-wings), usually projecting outwards, the adjacent wings of each pair of anthers nearly meeting and forming narrow fissures leading to the stigmatic cavities; connectives of the anthers often produced into membranous terminal appendages which are sometimes connate; pollen forming one or two granular or waxy masses (pollinia or pollen-masses) in each cell, the pollinia of the adjoining cells of two contiguous anthers united in pairs or fours either directly or by appendages (caudicles) to each of the 5 minute turgid or 2-fid bodies (pollen-carriers or corpuscles) which lie on the dilated part of the style. Ovary superior, of 2 one-celled distinct carpels enclosed

within the staminal column, with their styles united above into a disk (style-apex or style-table) which is 5-angled, short and included between the anthers, or is produced beyond them into a long or short simple or 2-fid column; ovules usually numerous, rarely few or solitary, anatropous, pendulous, imbricate in several series on the projecting placenta. Fruit of 2 follicles (1 sometimes suppressed). Seeds compressed, usually flat, often margined, crowned with a tuft of long hairs (coma) at one end; albumen thin or 0; embryo large; cotyledons flat; radicle short, superior.—Genera 320. Species 1700.—Mostly tropical, a few temperate.

A. Filaments usually free. Anthers acuminate or with a terminal appendage. Pollen-masses granular, in pairs in each cell
  I. Coronal scales corolline, free, short, thick
    a. Corolla very small, rotate, lobes valvate .... HEMIDESMUS.
    b. Corolla small, rotate, lobes overlapping .... CRYPTOLEPIS.
    c. Corolla large, funnel-shaped, lobes overlapping .... CRYPTOSTEGIA.
  II. Coronal scales connate into a lobed ring. Filaments without interposed glands
    Corolla rotate, lobes overlapping .... PERIPLOCA.
B. Anthers with membranous inflexed tip. Pollen-masses in pairs in each cell
  Corolla rotate, lobes overlapping to the right .... SECAMONE.
C. Anthers with a membranous inflexed tip. Pollen-masses solitary in each cell, sessile or pedicelled in pairs on the corpuscle, pendulous
  I. Corona single, corolline, 5-cleft .... GLOSSONEMA.
  II. Corona double, corolline and staminal .... OXYSTELMA.
  III. Corona staminal of 5 processes adnate to the anthers
    a. Stem erect
      1. Corolla valvate. Coronal processes laterally compressed .... CALOTROPIS.
      2. Corolla valvate. Coronal processes spathulate .... ASCLEPIAS.
    b. Stem twining. Corolla-lobes overlapping
      1. Corolla rotate. Coronal processes laterally compressed .... PENTATROPIS.
      2. Corolla funnel-shaped. Coronal processes laterally compressed .... DAEMIA.
  IV. Corona single, staminal, cupular or annular. Corolla rotate
    a. Corona of a 10-lobed ring and 5 horny processes behind the anthers .... HOLOSTEMMA.
    b. Corona annular. Leafy, erect or twining herbs or shrubs .... CYNANCHUM.
    c. Corona annular. Leafless straggling shrubs .... SARCOSTEMMA.
D. Anthers with a membranous inflexed tip. Pollen-masses solitary in each cell, sessile or pedicelled in pairs on the corpuscle

I. Corolla-lobes overlapping. Corona absent or corolline
  Stem twining. Corolla-lobes short. Corona on the corolla-tube .... GYMNEMA.

II. Corolla-lobes overlapping. Coronal processes on the staminal column rarely absent
  a. Corolla urceolate or salver-shaped. Coronal scales on the back of the anthers, simple .... MARSDENIA.
  b. Corolla rotate or salver-shaped. Coronal scales on the back of the anthers, notched .... PERGULARIA.
  c. Cymes various. Column minute. Coronal processes fleshy .... TYLOPHORA.
  d. Cymes racemiform. Column minute, fleshy. Coronal processes bifid .... COSMOSTIGMA.
  e. Cymes umbelliform, pendulous. Coronal scales spreading, cuspidate .... DREGEA.

E. Anthers incumbent on the stigma without a membranous tip. Pollen-masses one in each cell. Corolla-lobes valvate in all
  I. Corona double
    Calyx turbinate, 5-lobed. Corolla rotate .... LEPTADENIA.
  II. Corona staminal, simple or compound, annular, 5-10-lobed
    a. Corolla-tube long. Stem stout or slender, erect or twining .... CEROPEGIA.
    b. Corolla rotate, lobes very narrow. Flowers lateral, subsolitary .... CARALLUMA.
    c. Corolla rotate, lobes very broad. Flowers terminal, umbelled .... BOUCEROSIA.

Root acrid, stimulant; sometimes emetic, diaphoretic, and diuretic; often used as an antisyphilitic. The bark is purging and anthelmintic; the milky juice acrid and bitter.

Among the products isolated from the Order may be mentioned the glucosides asclepiadin and periplocin, and the alkaloid tylophorine.

OFFICIAL:—*Aspidosperma Quebracho* Schlechtendal (Spain); *A. Quebracho blanco* Schlechtendal (Austria, Sweden, Switzerland).

Gonolobus Condurango Triana (France).

Marsdenia spp. (Holland); *M. Condurango* Nichols (Norway), —Reichenbach fil. (Austria, Belgium, Denmark, Hungary, Japan, Russia, Turkey); *M. Cundurango* Nichols (Spain)=*Gonolobus Condurango* Triana (Italy); *M. cundurango* Reichenbach fil. (Germany, Sweden, Switzerland).

Vincetoxicum officinale Linn. (France).

HEMIDESMUS R. Br.

Twining shrubs. Leaves opposite. Flowers small, greenish purple, in axillary opposite crowded subsessile cymes. Calyx 5-partite, with glands inside at the base; segments acuminate. Corolla rotate, deeply 5-fid, fleshy; tube very short; lobes thick, valvate. Corona-scales 5, short, thick, on the throat of the corolla and alternate with its lobes. Stamens inserted at the base of the corolla-tube; filaments distinct or subconnate at the base; anthers small, cohering at the apex, terminated by an inflexed membrane; pollen-masses cohering in pairs in each cell, granular, the caudicles of the pollen-carriers dilated or hooded. Style-apex 5-gonous, flat on the top. Follicles divaricate, long, slender, terete, smooth. Seeds comose.—Species 1.—India.

1. **Hemidesmus indicus** R. Br. in Mem. Wern. Soc. I (1811) 57; Wight Ic. t. 594.—PLATE 618A.

A perennial prostrate or twining shrub; rootstock woody; stems numerous, slender, terete, glabrous or pubescent, striate, thickened at the nodes. Leaves very variable, from elliptic-oblong to linear-lanceolate, 5-10 cm. long, but of very variable breadth (from 0.8-3.8 cm.), apiculate, the narrow leaves acute, the broad ones often obtuse at the apex, glabrous, dark green, often variegated with white above, pale and sometimes silvery white and pubescent beneath, with reticulate veins; petioles 3-4 mm. long. Flowers crowded in subsessile cymes in the opposite axils; pedicels short, clothed with numerous ovate acute imbricating bracts. Calyx 2.5 mm. long, glabrous outside; lobes 1.5 mm. long, ovate, acute, with membranous ciliolate margins. Corolla 5-6 mm. long, greenish outside, purple inside; tube very short; lobes valvate, fleshy, 4 mm. long, ovate-oblong, acuminate. Follicles 10-15 cm. by 6 mm., cylindric, tapering to a point at the apex, straight or sometimes slightly curved, striate, glabrous. Seed 6-8 mm. long, ovate-oblong, flattened, black; coma silvery white, 2.5 cm. long.

Distribution: Upper Gangetic Plain, eastwards to Bengal and the Sundribuns, and from the Central Provinces to S. India and Ceylon.

The root is sweet, bitter, with a flavour; cooling, aphrodisiac, antipyretic, alexiteric, antidiarrhœal, astringent to the bowels; cures leprosy, leucoderma, itching, skin diseases, fevers, foul odour from the body, loss of appetite, asthma, bronchitis, "tridosha", diseases of the blood, leucorrhœa, "kapha", and "vata", dysentery and diarrhœa, thirst, burning sensation; useful in piles, rat bite poisoning, eye troubles, epileptic fits in children, and children's wasting diseases (Ayurveda).

The root is purgative, diaphoretic, diuretic; useful in hemicrania, pain in the joints, syphilis, leucoderma.—The leaves are good for vomiting, colds, wounds, leucoderma.—The stem has a bitter bad taste; diaphoretic, diuretic, laxative; lessens inflammation; good for diseases of the brain, the liver, the kidney; useful in syphilis, gleet and urinary discharges, uterine complaints, leucoderma, paralysis, cough, asthma; gargle good for toothache (Yunani).

The roots are used as a substitute for sarsaparilla. They are said to be sweet, demulcent, alterative, diaphoretic, diuretic and tonic. Useful in loss of appetite, disinclination for food, fever, skin diseases, syphilis and leucorrhœa.

The root is prescribed usually in the form of syrup. Sometimes the whole plant is pounded and a *congee* made with rice, or an infusion prepared of the dried leaves. In chronic cough and diarrhœa, the hot infusion with milk and sugar acts as an alterative and tonic, specially in children.

In the more southern parts of the Konkan, the milky juice is dropped into inflamed eyes; it causes copious lachrymation, and afterwards a sensation of coolness in the part. The root is tied up in plantain leaves and roasted in hot ashes; it is then beaten into a mass with cumin and sugar and administered with *ghi* as a remedy in heat or inflammation of the urinary passages. As a *lep*, the root is applied to swellings.

A liquid extract of the drug was given as a tonic in skin diseases, and as an alterative in chronic rheumatism. The action was found to be very slow in the few cases that improved under it (Koman).

The root in combination with other drugs is prescribed in snakebite (Charaka, Sushruta, Vagbhata, Sharangdharasamhita, Yogarat-

nakara, Rasaratnakara) and scorpion-sting (Charaka, Sushruta); but the root is not an antidote to either snake-venom (Mhaskar and Caius) or scorpion-venom (Caius and Mhaskar).

Arabic: Aushbatunnar, Zaiyan—; *Badaga:* Kanyaburu—; *Bengal:* Anantamul, Anatomul—; *Bihari:* Ununtamul—; *Bombay:* Uparsara—; *Canarese:* Dudavali, Haleberuballi, Hamadaberu, Karibandha, Kempugandhi, Nannariberu, Sugandhiballi, Sugandhiberu—; *Deccan:* Nannari, Natkaaushbah, Sugandipala—; *English:* False Sarsaparilla, Indian Sarsaparilla—; *Gujerati:* Durivel, Kapurimadhuri, Upalasali, Upalasari, Usbamagarli, Usbo—; *Hindi:* Hindisalsa, Janglichanbelli, Magrabu—; *Malayalam:* Nannari, Narunari, Naruninti, Paravalli—; *Marathi:* Anantamul, Lahankavali, Upalasari, Uparasal—; *Mundari:* Huringonol, Onolsing—; *Panchmahals:* Kakdiokunther—; *Persian:* Aushbahehindi, Yasaminebarri—; *Porebunder:* Kagdiokunther—; *Sanskrit:* Ananta, Anantamula, Asphota, Bhadra, Bhadravalli, Bhadravallika, Dhavalashariva, Gopa, Gopakanya, Gopavadhu, Gopavalli, Gopi, Karala, Kashthashariva, Krishodari, Lata, Nagajivha, Pratanika, Raktasariva, Sariva, Sharada, Shariva, Shyama, Sugandha, Sugandhi, Utpalashariva—; *Sinhalese:* Irimusu—; *Spanish:* Zarzaparrilla de la India, Zarzaparrilla falsa—; *Tamil:* Arakkam, Aritinviyachi, Aruninam, Kananusari, Kiruttinavalli, Nannari, Pargodi, Sasbam, Saribam, Sariyam, Sirunannari, Urgadam—; *Telugu:* Adavippatitige, Gadisugandhi, Muttavapulagamu, Nallasugandhipala, Sugandhi, Palasugandhi, Sugandhipala, Tellasugandhipala—; *Urdu:* Aushbah, Aushbahemaghrabi—; *Uriya:* Ditsukry, Guapanomulo, Luhamado, Mojanoi, Onontomulo, Sugondhi—.

CRYPTOLEPIS R. Br.

Glabrous shrubs usually twining. Leaves opposite. Flowers small, in axillary lateral or terminal lax usually few-flowered pedunculate cymes. Calyx 5-partite. Corolla-tube short, cylindric or campanulate; lobes 5 overlapping to the right in bud; corona of 5 filiform or fleshy lobes or processes arising from about the middle of the corolla-tube. Stamens inserted towards the base of the corolla-tube; filaments free; anthers more or less triangular with the connective

CRYPTOSTEGIA R. Br.

Lofty climbers. Leaves opposite. Flowers large, in terminal 3-chotomous cymes. Sepals lanceolate. Corolla funnel-shaped, tube short, throat campanulate; lobes broad, overlapping and twisted to the right. Coronal scales at the base of the throat, subulate, entire or 2-cleft. Filaments short; anthers adnate to the stigma, acute; pollen-masses in pairs in each cell, granular, appendages subspathulate. Stigma convex. Follicles thick, divaricate, hard, 3-winged, furrowed between the wings. Seeds comose.—Species 2.—Tropical Africa, Madagascar.

C. madagascariensis Bojer is used medicinally in Madagascar.

1. **Cryptostegia grandiflora** R. Br. in Bot. Reg. t. 435; Wight Ic. t. 832.

A large evergreen glabrous woody climber, stems up to 15 cm. diam., bark grey, juice copious milky. Leaves opposite, 5-10 by 3.8-5 cm., elliptic, usually abruptly narrowed at both ends, coriaceous, glossy above green beneath, lateral nerves numerous slender arched; petiole 7.5-13 mm. long, the bases of opposite pairs of petioles joined by a slightly raised line. Flowers about 5 cm. across, pinkish purple, in terminal di- or tri-chotomous, few-flowered cymes. Peduncle and pedicels stout, hoary or glabrous; bracts caducous. Calyx glabrous or hoary, cleft nearly to the base, lobes ovate-lanceolate, acute, with numerous glands at the base. Corolla funnel-shaped, over 5 cm. long, shortly tubular below, throat campanulate; lobes broad, acute, overlapping to the right in bud, glabrous. Corolla of 5 scales inserted at the base of the throat, each scale cleft into two, long, subulate segments. Stamens with short filaments, anthers adnate to the stigma, connectives produced into acute processes connivent over the stigma; pollen-masses granular, in pairs in each cell. Ovary half-inferior; stigma convex. Follicles 10-12.5 cm. long by 2.5 cm. broad near the base, woody, angled or winged, divaricate. Seeds 7.5 mm. long, oblong, compressed; coma 3.8 cm. long.

Distribution: Native of tropical Africa.—Cultivated in India.

The leaf is toxic.

Malayalam: Pala—; *Marathi:* Vilarjuti vakundi, Vilayativakhandi—; *Tamil:* Garudappalai, Palai—.

PERIPLOCA Tourn. ex Linn.

Erect or twining shrubs, sometimes leafless. Leaves when present opposite. Flowers in lax axillary or terminal cymes. Calyx 5-partite. Corolla rotate; lobes 5, usually bearded inside, overlapping to the right; corona a 10-lobed ring arising from the corolla a little above the stamens, often produced behind the stamens into 5 subulate or branched processes. Stamens inserted a little above the base of the corolla within the corona; filaments free, broad, short; anthers bearded on the back or at the base, conniving over and adhering to the style-apex, the connective produced into an apiculus by which they are usually connate at the tips; pollen-masses in pairs in each cell (20 in all), granular. Style-apex convex or subtruncate. Follicles smooth. Seeds comose.—Species 12.—S. Europe, Asia, Africa.

P. graeca Linn. is used medicinally in Europe.

1. **Periploca aphylla** Dcne. in Jacquem. Voy. Bot. (1844) 109, t. 116.—PLATE 619A.

An erect branched milky shrub, very commonly leafless; stems many, 1.8-3 m. long, rarely as thick as a goose-quill, twiggy, glabrous; bark greenish, rugosely striate. Leaves when present 6 mm. long, ovate-oblong, acute, thick, nerveless. Flowers fragrant, numerous, in glabrous cymes (often opposite) 1.3-2.5 cm. long and broad, on short thick peduncles or branched from the base; bracts ovate-oblong, subobtuse, with scarious margins, breaking off about the middle and leaving the lower thick portion; buds globose. Calyx 3 mm. long, glabrous; segments 2.5 mm. long, broadly ovate-oblong, obtuse with scarious margins. Corolla greenish outside, dark purple within; tube very short; lobes 4-6 mm. long, oblong, obtuse, densely bearded inside near the apex, reflexed; corona-lobes 6 mm. long, the basal portion transversely oblong, truncate, the apical portion filiform, recurved at the apex. Filaments of the stamens glabrous; anthers deltoid-ovate, hairy on the back. Follicles on short thick peduncles,

widely divergent, 7.5-10 cm. by 6 mm., rigid, woody, terete, pointed. Seeds 6 mm. long; coma 2.5 cm. long.

Distribution: Salt Range and Punjab plains from the Jhelum westwards, sub-Himalayan tract in Rawalpindi and Hazara ascending to 4,000 ft., Waziristan, Baluchistan, Sind.—Afghanistan, Persia, Arabia, Egypt.

The milky juice is used in Sind as an external application to tumours and swellings (Murray).

At Saruna in Jhalawan, the flowers are eaten, and a decoction of the bark serves as a purgative medicine. In the Bolan Pass the plant is considered as a fodder for camels and a cure for pains in the stomach (Hughes-Buller).

Afghanistan: Hum, Huma—; *Baluchistan:* Barrar, Batah, Gishtar, Hum, Huma, Shabbi, Um, Uma—; *Bolan Pass:* Hum—; *Jhalawan:* Hum—; *Kachhi:* Gishitin—; *Kohlu:* Barar—; *Makran:* Gishtir, Khurbah—; *Punjab:* Barrara, Barri, Bata—; *Sind:* Buraye—; *Zhob:* Barara—.

Secamone R. Br.

Climbing or straggling shrubs or undershrubs. Leaves opposite. Flowers small or minute, in sessile or shortly peduncled lax axillary 2-3-chotomous cymes. Corolla rotate, 5-cleft; lobes (in Indian species) overlapping to the right. Coronal scales 5, adnate to the staminal tube, laterally compressed, tips free. Filaments short, connate; anthers-tips small, membranous, inflexed; pollen-masses in pairs in each cell, small, globose, waxy, corpuscles minute. Stigma beaked, 2-fid, or low and conical. Follicles stout or slender, acuminate, smooth, terete or angled.—Species 60.—Palæotropics.

S. ligustrifolia Decne. is used medicinally in Madagascar.

1. **Secamone emetica** R. Br. in Mem. Wern. Soc. I (1811) 56; Wight Ic. t. 1283.—Plate 620.

Stems numerous, slightly twining, slender, wiry, glabrous, cylindrical, much thickened at nodes. Leaves 5-6.3 cm., linear-lanceolate or linear, acute at base, tapering and very acute at apex, glabrous, petiole short, slender. Flowers on slender pubescent pedicels, cymes stalked, lax, dichotomous, bracts small, woolly-pubes-

cent. Calyx pubescent, segments ciliolate; corolla under 6 mm. diam., lobes oblong-oval, obtuse; follicles 5-7.5 cm., much acuminate, smooth.

Distribution: Deccan and Carnatic from Nellore to Coimbatore, south to Tinnevelly, Ceylon.

It is regarded as a powerful emetic.

Bengal: Shadaburi—; *Canarese:* Siranigehambu—; *Tamil:* Angaravalli, Kondam, Kurinja, Perungurinja, Sagadam, Samalugam, Sarachiru—.

Glossonema Decaisne.

Dwarf perennial (rarely annual) herbs, often hoary, branched from the base. Leaves opposite. Flowers small, in few-flowered lateral or sublateral cymes arising from between the base of the petioles, rarely solitary. Calyx 5-partite. Corolla subcampanulate; tube short; lobes 5, suberect or spreading, overlapping to the right; corona arising from the corolla-tube a little above the origin of the staminal column, of 5 broad hyaline obtuse or acute entire or bifid lobes alternating with the corolla-lobes. Staminal column short; anthers terminated by an inflexed membrane; pollen-massess pendulous, solitary in each anther-cell, attached in pairs to the pollen-carriers by short almost obsolete caudicles. Style-apex usually exserted beyond the anthers, fleshy, conical, clavate or peltate. Follicles thick, acuminate, usually echinate. Seeds comose.—Species 6.—Tropical Africa and Asia.

The genus is therapeutically inactive.

1. **Glossonema varians** Benth. in Benth. & Hook. f. Gen. Pl. II (1876) 748.

A small erect annual herb 10-15 cm. high, much branched from near the base; branches pubescent. Leaves fleshy, hairy on both sides, 2.5-6.3 by 2-5 cm., the lower leaves rotund-ovate, subcordate, obtuse or retuse, the upper elliptic, acuminate; margins entire or crisped; petioles 0.6-2.2 cm. long. Flowers fragrant, white or yellow, in subsessile umbellate 2-8-flowered cymes; pedicels very short; buds ovoid. Calyx hairy, divided nearly to the base; segments 3 mm.

long, linear, acute, ciliate. Corolla 6 mm. long, glabrous; lobes 3-4 mm. long, oblong, obtuse, veined; corona-lobes about 2.5 mm. erect-patent, entire or bifid at the apex. Pollen-masses attached to the pollen-carriers by very short caudicles. Style-apex conical, fleshy, much exserted. Follicles 2.5-5 cm. long, ellipsoid, beaked, attenuated at the base, covered with short soft scattered spines and minutely cano-pubescent. Seeds 4-6 mm. long, broadly ovate, acute, much flattened, and with very thin (almost papery) margins, sinuate-dentate at the broader end, yellowish brown; coma 1.3 cm. long, white.

Distribution: Sind, Baluchistan.—Persia.

The fruit is cooling and digestible.

Ormara: Galaon, Gulloo—; *Pab:* Khurram—.

OXYSTELMA R. Br.

Twining glabrous shrubs or undershrubs. Leaves opposite. Flowers large and handsome, in lax racemose or subumbellate cymes or solitary; pedicels filiform. Calyx small, 5-partite, glandular inside. Corolla with a very short tube with a densely pubescent ring at its mouth (sometimes described as a corolline corona) within, and a broad saucer-shaped limb 5-lobed ½-way down; lobes deltoid, acute, valvate at the base, the tips overlapping to the right in bud; corona of 5 erect ovate or lanceolate acute lobes with 2 keels inside arising from the staminal column. Stamens inserted at the base of the corolla-tube; filaments short, connate; anthers erect, terminated by a short inflexed membranous appendage; pollen-masses pendulous, waxy, elongate-clavate, compressed, attached in pairs by their attenuated ends to the short ovoid pollen-carriers. Style-apex truncate or convex, not exserted beyond the anthers. Follicles often solitary, oblong and obtuse or lanceolate and acute. Seeds comose.—Species 10.—Tropics and subtropics.

O. esculentum R. Br. is used medicinally in Egypt.

1. **Oxystelma esculentum** R. Br. in Mem. Wern. Soc. I (1811) 40.—PLATE 619B.

A perennial twining herb with milky juice; roots fibrous from the lower nodes; stems numerous, long, much-branched, slender,

glabrous. Leaves deciduous, 4.5-9 cm. by 3-8 mm., linear or linear-lanceolate, acute, thin, pale green, glabrous, base acute or rounded; petioles 5-13 mm. long, very slender. Flowers large, strikingly handsome, drooping, in pedunculate lateral subumbellate or racemose few (usually 2-4-) flowered cymes longer than the leaves; peduncles long, sometimes reaching 3.8 cm. or more, slender; pedicels 1.3-2 cm. long, filiform, thickened upwards. Calyx glabrous, divided nearly to the base; segments 5, oblong-lanceolate, acute, 3 mm. long, glandular inside. Corolla pale rose coloured or nearly white, glabrous, more than 2.5 cm. across when expanded, saucer-shaped; tube scarcely any, the mouth with a densely pubescent ring; limb 2 cm. long; lobes 1 cm. long, deltoid, acute, conspicuously ciliate, veined with purple; corona staminal, the lobes 5 mm. long, ovate-lanceolate, acuminate, with incurved entire subulate tips. Anthers with inflexed membranous deltoid tips; pollen-masses 1 in each cell, pendulous. Style-apex slightly convex. Follicles 3.8-6.3 cm. long, ovoid-lanceolate, tapering to a point, glabrous. Seeds very numerous, 3 mm. long, broadly ovate, flat, the margins thin, often minutely and obscurely denticulate near the base, black; coma 2 cm. long.

Distribution: Throughout the plains and lower hills of India, usually near water, Ceylon.—Java.

The plant is hot, bitter, pungent; dry, indigestible; causes flatulence; diuretic, laxative, aphrodisiac, anthelmintic; useful in leucoderma and bronchitis (Ayurveda).

The fruit is bitter; tonic, expectorant, anthelmintic; the juice is used in gleet, gonorrhœa, pain in the muscles, cough, leucoderma; given to children as an astringent (Yunani).

A decoction of the plant is used as a gargle in aphthous ulcerations of the mouth and in sore-throat. The milky sap forms a wash for ulcers in Sind. In combination with turpentine it is prescribed for itch.

Probably on account of the milky juice which it exudes, native practitioners ascribe galactagogue properties to this plant. It has a very bitter taste, and is said to possess marked antiperiodic properties.

The fresh roots are, in Orissa, held to be a specific for jaundice.

Bengal: Dudhi, Dudhialata, Dudhlutta, Khirai, Kirui—; *Bombay:* Dudhika—; *Canarese:* Dugdhike, Tikkaludugdhike—; *Ceylon:* Kulappalai—; *Gujarati:* Jaldudhi—; *Hindi:* Dudhialata, Dudhi, Dudlutta, Dugdhica, Kyirin—; *Marathi:* Dhudani, Dudhari, Dudhatani—; *Porebunder:* Narod—; *Punjab:* Gani, Gharote—; *Sanskrit:* Dudhialata, Dugdhi, Dugdhika, Grahini, Kachhara, Kshiratmika, Kshiravi, Kshiravika, Kshiri, Kshirini, Marudbhava, Svaduparni, Tamramula, Tiltadurgha—; *Sind:* Dhudhi, Garaykhiri—; *Tamil:* Usippalai—; *Telugu:* Chirupala, Dudipala, Nelapala, Palakikura, Palakura, Pinnapala, Sepa—; *Urdu:* Dudhi—; *Uriya:* Dudhai—.

CALOTROPIS R. Br.

Large erect shrubs or small trees. Leaves opposite, broad, subsessile. Flowers of medium size, in umbellate or subracemose lateral pedunculate cymes. Calyx of 5 distinct sepals, glandular inside, broadly ovate. Corolla broadly campanulate or subrotate, divided more than ½-way down; lobes broad, naked, valvate; corona of 5 fleshy laterally compressed lobes, adnate to and standing out as wide buttresses from the staminal column with an upcurved and involute spur at the base and bifid at, or with 2 obtuse auricles a little below, the apex. Anthers short and broad, with short broad membranous appendages inflexed over the depressed pentagonal summit of the style-apex; pollen-masses solitary in each anther-cell, pendulous, attached to the pollen-carriers by short slender caudicles. Follicles short, thick, not echinate. Seeds comose.—Species 4.—Tropical Asia, Africa.

1. Corona-lobes narrow, shorter than the staminal column with 2 obtuse auricles just below the entire apex .... 1. *C. gigantea.*
2. Corona-lobes broad, equalling or longer than the staminal column, without auricles below the bifid apex .... 2. *C. procera.*

C. gigantea R. Br. is used medicinally in Annam and the Malay Archipelago; *C. procera* R. Br. in the Gold Coast, and in Guinea.

1. **Calotropis gigantea** R. Br. in Ait. Hort. Kew. ed. 2, II (1811) 78; Wight Ill. tt. 155, 156A.—PLATE 621A.

A tall shrub reaching 2.4-3 m. high; bark yellowish white, furrowed; branches stout, terete, more or less covered (especially the younger ones) with fine appressed cottony pubescence. Leaves 10-20 by 3.8-10 cm., sessile or nearly so, elliptic-oblong or obovate-oblong, acute, thick, glaucous-green, clothed beneath and more or less above with fine cottony tomentum; base narrow, cordate, sometimes amplexicaul. Flowers inodourous, purplish or white, 3.8-5 cm. diam., in umbellate lateral cymes; peduncles from between the petioles, 5-9 cm. long, dilated at the base; pedicels much longer than the flowers, covered with cottony wool; buds ovoid. Calyx divided to the base; sepals 6 by 4 mm., ovate, acute, cottony. Corolla 2 cm. long or more; lobes 1.3-1.6 cm. long, deltoid-ovate, subacute, revolute and twisted in age; lobes of the corona 1.3 cm. long by 5 mm. broad in the middle, shorter than the column, the back much curved towards the column above the obtuse spur, pubescent on the slightly thickened margin, the apex rounded (not bifid) with 2 obtuse auricles just below it. Follicles 9-10 cm. long, broad, thick, fleshy, ventricose, green. Seeds numerous, 6 by 5 mm., broadly ovate, flattened, narrowly margined, minutely tomentose, brown; coma 2.5-3.2 cm. long.

Distribution: Throughout India, Ceylon.—Malay Islands, S. China.

The plant is purgative, alexipharmic, anthelmintic; cures leprosy, leucoderma, ulcers, tumours, piles, diseases of the spleen, the liver, and the abdomen; the juice is anthelmintic and laxative; cures piles and "kapha".—The root bark is diaphoretic; cures asthma and syphilis.—The flower is sweet, bitter; anthelmintic, analgesic, astringent; cures inflammations, tumours, "kapha", rat-bite; good in ascites.—The milk is bitter, heating, oleagenous, purgative; cures leucoderma, tumours, ascites, diseases of the abdomen (Ayurveda).

All parts of the plant dried and taken with milk act as a good tonic, expectorant, and anthelmintic.—The leaves are applied to paralysed parts, painful joints, swellings; heal wounds.—The milk is caustic, acrid; expectorant, depilatory, anthelmintic; useful in

leprosy, scabies, ringworm of the scalp, piles, eruptions on the body, asthma, enlargement of spleen and liver, dropsy; applied to painful joints, swellings.—The flowers are stomachic and good for the liver (Yunani).

Oil, in which the leaves have been boiled, is applied to paralysed parts, a powder of the dried leaves is dusted upon wounds to destroy excessive granulation and promote healthy action.

The root, bark, and juice of this plant are used in medicine for their emetic, diaphoretic, alterative, and purgative properties. In the treatment of dysentery, the dried bark of the root is stated to be an excellent substitute for Ipecacuanha. The bark, root, and dried milky sap may be used in small doses in certain cutaneous affections, such as leprosy and secondary syphilis; the root-bark, in large doses, is an emetic. It is administered to promote secretions, and is stated to be useful in enlargements of the abdominal viscera, intestinal worms, cough, ascites, anasarca, etc. The flowers are considered digestive, stomachic, tonic, useful in asthma, catarrh, and loss of appetite. The powder of the root in 3 to 5 grains promotes gastric secretion and acts as a mild stimulant and may be given with carminatives in dyspepsia. It is also given as a febrifuge.

The tincture from the leaves was tried as an antiperiodic in cases of intermittent fevers. It was found to be useful in many cases. The powdered root bark in doses of five grains was given to several cases of dysentery and was generally found to give relief (Koman).

The plant is a popular remedy for snake-bite and scorpion-sting; but every part of it is quite useless in the antidotal and symptomatic treatment of either snake-bite (Mhaskar and Caius) or scorpion-sting (Caius and Mhaskar).

A proteolytic enzyme, somewhat similar to papain, has been found in the milky juice by Basu and Nath (20th Ind. Sc. Congress; Patna, 1933).

Annam: Mercure végétal, Mudar—; *Arabic:* Ashur, Oschor, Oshmor, Ushar—; *Bengal:* Akanda, Gurtakand, Swetakond—; *Bolan:* Karagh—; *Bombay:* Akanda, Akra, Mandara, Rui—; *Burma:* Maioh, Mayo, Mayobeng, Mayobin, Mayomayopin, Mayopin—; *Canarese:*

Arka, Ekke, Mandara, Yekkadaguda—; *Ceylon:* Errukalai, Manakkovi, Urkkovi—; *Deccan:* Ak, Akra—; *Fort Sandeman:* Spalmai—; *French:* Asclépiade gigantesgue, Faux arbu à soie, Faux arbre de soie, Mercure végétal, Mudar—; *Gond:* Kadrati—; *Gujarati:* Akado, Akdamujhada, Dholaakdo, Nohanoakdo, Ratoakdo—; *Hindi:* Ag, Ak, Akan, Akond, Ark, Lalak, Lalmadar, Madar, Mudhar, Safedak—; *Italian:* Kapok d' Eritrea, Seta vegetale—; *Java:* Waduri—; *Kila Saifulla:* Spalmai—; *Konkani:* Rhui—; *Kumaon:* Ak, Ank—; *Malayalam:* Bukam, Dinesam, Erikku, Vellerikku, Yerriku—; *Marathi:* Akanda, Akdachajhada, Lalakara, Lalmadar, Lalrui, Muda, Rui—; *Nepal:* Auk—; *Persian:* Khark—; *Sanskrit:* Aditya, Aharbandhava, Aharmani, Aharpati, Arka, Aryama, Asphota, Asphotaka, Bhanu, Bhaskara, Divakar, Ganarupa, Haridashva, Himarati, Jambhala, Kharjjughna, Kirtanuphala, Kshiradala, Kshirakandaka, Kshiranga, Kshiraparni, Mandara, Prabhakara, Pratapa, Puchhi, Ravi, Sadapyshpa, Sadasuma, Saptashva, Savita, Shitapushpaka, Shukaphala, Sunu, Suryavgha, Tulaphala, Ushnarashmi, Vasuka, Vibhakara, Vibhavasu, Vikarttana, Vikorana, Vikshira, Vivasvana, Vivaswana—; *Santal:* Ahauna—; *Sibi:* Spalmai—; *Sind:* Bijalosha—; *Sinhalese:* Muduwara, Vara, Varagaha—; *Tagalog:* Capolcapol—; *Tamil:* Arkkam, Arukkam, Arulagam, Ahgaram, Alagar, Aruchunam, Erukkam, Erukku, Mirugusayidagam, Nubam, Sadabadam, Sadabudam, Sevverukku, Siyam, Suriyam, Suvedagusuman, Udumbaram, Vellerukku, Mandarasu—; *Telugu:* Arkamu, Jilledu, Mandaramu, Nallajilledu, Rachajilledu, Uste, Tellajilledu—; *Tigré:* Gende, Ghinda—; *Tulu:* Ekkamale—; *Urdu:* Ak—; *Uriya:* Akondo, Bikkortono, Kotuki, Orko—.

2. **Calotropis procera** R. Br. in Ait. Hort. Kew. ed 2, II (1811) 78; Wight Ic. t. 1278.—PLATE 621B.

An erect shrub usually 1.8-2.4 m. high (sometimes growing much higher in arid places); young parts clothed with white cottony tomentum; bark soft, corky, spongy. Leaves subsessile, usually 5.7-15 by 4.5-8.2 cm. (exceptionally 23 by 15 cm.), broadly ovate, ovate-oblong, elliptic or obovate, with a short abrupt acumination, cottony-pubescent when young, at length glabrous. Flowers in umbellate cymes which are at first tomentose, but becoming nearly glabrous;

peduncles 2.5-7.5 cm. long, lateral; pedicels 6 mm. long; buds globose. Calyx divided to the base, glabrous; sepals 5-2.5 mm., ovate, acute. Corolla glabrous, about 2.5 cm. across, divided about $^{2}/_{3}$ of the way down; lobes usually erect, ovate, acute, 1 cm. long; lobes of the corona 6 by 4-5 mm., compressed, equalling or exceeding the staminal column, the bark nearly straight or sometimes slightly curved away from the column above the upcurved subacute spur, usually glabrous but sometimes slightly scabrous-pubescent along the outer margin, the apex obliquely truncate, bifid and without auricles. Follicles 7.5-10 by 5-7.5 cm., subglobose, ellipsoid or ovoid. Seeds 6 by 4 mm., broadly ovate, acute, flattened, narrowly margined, minutely tomentose, light brown; coma 3.2 cm. long.

Distribution: More or less throughout India in warm dry places, Waziristan, Afghanistan, Persia, Arabia, Egypt, tropical Africa.

The medicinal properties of the plant are similar to those of *C. gigantea;* very bitter, heating, laxative, anthelmintic; relieves strangury; cures ulcers; the ashes act as an expectorant.—The leaves are applied hot to the abdomen to cure the pain inside.—The flower is tonic, appetiser, stomachic, antisialagogue, strengthening; cures piles and asthma (Ayurveda).

The milky juice is used as a blistering agent. The fresh root is used as a tooth-brush, and is considered by Pathans to cure toothache.

The flowers are believed to have detergent properties. They are given in cholera.

The fresh milk is employed in the Punjab for the purposes of infanticide. In a drachm dose the fresh juice will kill a large dog in 15 minutes; its action, though slower, resembles that of hydrocyanic acid, but commences with foaming at the mouth.

In Las Bela, the warmed leaves are used as a poultice. At Khawas the flowers are put in oil and applied to wounds to cure them; the milky juice of the plant is also used with other ingredients (Hughes-Buller).

In Gambia, the plant is said to be a good cure for sprains, headaches, and other pains; the leaves are applied warm to the affected part.

The Hausas and Northern Territories people use this plant greatly in medicine. The leaves are used to cure headache. The plant is also used in treating eye troubles. The leaves and fruits are boiled together and are used in the extraction of guinea worm, by the immersion of the infected limb, either for several hours or on two or three consecutive days. It is used as an enema.

In the Gold Coast, the leaves cure swollen legs and also wounds caused by rusty nails. The leaves are said to cure catarrh, being warmed first of all and then the juice is dropped into the nose. This causes the patient to sneeze, which relieves the accumulation of mucous material. This treatment takes place in the early morning and in the evening. Hot water is applied afterwards.

The latex is used as a poison by the Danoa or Haddad in the South-Eastern portion of the Kanem.

Hill and Sarkar have published the results of their chemical examination of the root-bark (*Journ. Chem. Soc.;* 1915).

Afghanistan: Spalwakka—; *Arabic:* Ochar, Osher—; *Burma:* Mayopin, Mehobin—; *Dankalo:* Gala—; *Ewe:* Gboloba—; *Ga:* Blorfototo—; *Gambia:* Fouftan—; *Gold Coast:* Sodom Apple—; *Hindi:* Ag, Ak, Akada, Madar, Safedak—; *Kanem:* Kajo, Sano, Taso—; *Khawas:* Ak—; *Kumaon:* Ak—; *Las Bela:* Karag—; *Marathi:* Mandara—; *Mundari:* Kulatoa—; *Punjab:* Ak, Shakarallighal, Shakarulushar—; *Sanskrit:* Adityapushpika, Alarka, Arka, Bimbora, Dirghpushpa, Ganarupaka, Ganarupi, Kashthila, Mandara, Pratapa, Rajarka, Raktarka, Rupika, Sadapushpa, Sadapushpi, Shambhu, Sharkarapushpa, Shitakarka, Shivavhaya, Shuklaphala, Shveta, Shvetarka, Tapana, Vasuka, Vedha, Vrittamallika—; *Shahrig:* Ispalmen—; *Sind:* Ak—; *Sudan:* Ushar—; *Tamil:* Vellerukku—; *Telugu:* Jilledu, Mandaramu, Nallajilledu—; *Tigrinia:* Akalo, Dinda, Uscher—; *Trans-Indus:* Pashkand, Spalmak, Spulmei—; *Uriya:* Orko—; *Wolof:* Fafetone—.

Asclepias Linn.

Perennial erect herbs. Leaves opposite, alternate or whorled. Cymes umbelliform; flowers medium sized or small. Sepals glandular

within. Corolla rotate, lobes often reflexed, naked, valvate. Coronal scales 5, erect, adnate to the column, spoon-shaped. Anther-tips membranous, inflexed; pollen-masses one in each cell, pendulous, flattened, waxy. Stigma depressed, 5-angled. Follicles turgid, beaked, smooth. Seeds comose.—Species 160. America, Africa, especially United States.

Root diaphoretic, expectorant, and cathartic.

A. curassavica Linn. is used medicinally in the Philippine Islands, Tropical America, the West Indies, La Reunion, the Gold Coast; *A. incarnata* Linn., *A. syriaca* Linn., *A. tuberosa* Linn. are used in North America; *A. aurea* Schltr., *A. crispa* Berg., *A. decipiens* N. E. Br., *A. fruticosa* Linn., *A. stellifera* Schl. in South Africa.

1. **Asclepias curassavica** Linn. Sp. Pl. (1753) 215.—PLATE 622B.

An erect undershrub 0.9-1.2 m. high. Leaves opposite, 7.5-10 by 1.3-2.5 cm., lanceolate, thin, membranous, narrowed at both ends; petiole 5 mm. long. Flowers 7.5 mm. across, orange, in axillary umbels; peduncle 2.5 cm. long; pedicels 1.8 cm. long. Calyx 2.5 mm. long, cleft to the base, lobes oblong-lanceolate. Corolla 6 mm. long, lobes reflexed in flower, valvate in bud. Corona bright orange, of 5 erect processes adnate to the stipe of the staminal column. Staminal column distinctly stipitate, anthers with membranous inflexed tips; pollen masses solitary in each cell, pendulous, flattened, waxy. Follicles solitary, erect, 7.5 cm. by 7.5-10 mm., straight, tapering at both ends, pericarp thin. Seed ovoid, 5 mm. long, dark brown; coma 3 cm. long.

Distribution: Introduced from the W. Indies. Naturalized in many parts of India.

The root is regarded as purgative, and subsequently astringent. It is also a remedy in piles and gonorrhœa.

The root and expressed juice are emetic and also cathartic. The juice of the leaves has been strongly recommended as anthelmintic; and it is useful in arresting hæmorrhages and in obstinate gonorrhœa.

The root is considered emetic and purging in Guiana. The decoction is astringent and given in leucorrhœa in the form of injections. The latex is applied to corns, and also used as an emetic.

In the Gold Coast, the powdered leaves and flowers are used for treating sores and wounds. The plant is recommended for phthisis.

Bombay: Kakatundi, Kuraki—; *Cuba:* Flor de la Calentura—; *English:* West Indian Ipecacuanha, Wild Ipecacuanha—; *French:* Faux ipéca—; *French Guiana:* Bouquet-soda, Bouquet-soldat, Codio, Ipéca nĕgre—; *Gold Coast:* Blood Flower, Red Head—; *La Reunion:* Herbe ă chenilles, Corbeille d'or ā ouate—; *New Caledonia:* Herbe ă gendarmes—; *Punjab:* Kaktundi—; *Spanish:* Arbol de la seda, Chuchumeca del Peru, Flor de la Reina, Flor de seda—; *Tagalog:* Bulacbulacan, Bulaccastila, Bulacdamo, Buquitquit, Calalauan, Capolcapol—.

PENTATROPIS R. Br.

Slender twining herbs or undershrubs. Leaves opposite, petiolate. Flowers small, in lateral umbellate cymes. Calyx 5-partite. Corolla divided nearly to the base; lobes 5, elongate, suberect, overlapping to the right, twisted to the left; corona simple, of 5 laterally compressed lobes adnate for $^1/_2$ to $^2/_3$ of their length to the backs of the anthers. Staminal column arising from the base of the corolla; filaments connate; anthers with membranous appendages inflexed over the truncate apex of the style; pollen-masses pendulous, 1 in each anther-cell, attached by short slender caudicles to the pollen-carriers, not compressed, waxy. Follicles lanceolate, narrowed into a beak, small, glabrous. Seeds comose.—Species 8.—Palæotropics.

1. Corolla-lobes with long linear tails .... 1. *P. cynanchoides.*
2. Corolla-lobes lanceolate-deltoid (not tailed) .... 2. *P. microphylla.*

The genus exhibits astringent properties.

1. **Pentatropis cynanchoides** R. Br. in Salt Voy. Abyss. (1814) Append. 64.—*P. spiralis* Decne. in Ann. Sc. Nat. sér. 2., IX (1838) 327.—PLATE 622A (under *P. Spiralis* Decne.).

Shrubby, glabrous or nearly so; stems twining, slender. Leaves 2-3.8 cm. long, very variable in breadth (6-20 mm.), ovate or oblong

or elliptic or linear, acute or obtuse, usually mucronate, more or less fleshy, glabrous; petioles 2.5-8 mm. long, slender. Flowers greenish, in lateral umbellate 3-6-flowered cymes; peduncles from between the petioles, slender, rarely reaching 6 mm. long, sometimes almost 0; pedicels 6-13 mm. long, filiform; buds acuminate. Calyx deeply divided, slightly pubescent; segments 1.25-1.5 mm. long, ovate, acuminate. Corolla divided almost to the base; lobes 8-13 mm. long, narrowly linear from a triangular base which is about 3 mm. broad, glabrous outside, minutely puberulous inside, the apex often curled; corona-lobes 1.5 mm. long, arising a little above the base of the staminal column, slightly shorter than the column, deltoid-ovate, with subtruncate base and acute or acuminate apex, compressed, adnate to the column for $^2/_3$ of its length. Follicles 5-7.5 by 0.8 cm., lanceolate, tapering into a beak, smooth, glabrous. Seeds 4 mm. long, ovate, flattened, minutely and irregularly crenate at the lower end; coma 2-2.5 cm. long.

Distribution: Punjab, eastwards to the Jumna, Baluchistant Sind.—Afghanistan, Arabia, tropical Africa.

The plant is bitter, acrid, heating; emetic; cures "kapha", inflammations, piles, leucoderma, biliousness (Ayurveda).

The dry roots are given in decoction as an astringent and a cooling alterative; they are used in gonorrhœa.

Bombay: Singarota—; *Gujerati:* Shigaroti—; *Hindi:* Kauathodi—; *Marathi:* Shvetakavali—; *Punjab:* Ambarvel, Vanveri—; *Sanskrit:* Chorasnayu, Dhvankshanakhi, Dhvankshanasa, Dhvankshatunda, Kakakshi, Kakanasa, Kakangi, Kakaprana, Kakashashru, Kakatundaphala, Kakatundi, Shirobala, Sunasika, Surangi, Taskarasnayu, Vayasavha, Vayasi—.

2. **Pentatropis microphylla** W. & A. in Wight Contrib. (1834) 52; Wight Ic. t. 352.

A twining glabrous perennial herb, often slightly woody at the base; stems very slender. Leaves 1.3-2.5 by 1-2 cm., broadly oblong or ovate-elliptic, obtuse, mucronate, base rounded or cordate; petioles 4-6 mm. long. Flowers in lateral few-flowered cymes; peduncles

3-2.5 mm. long or less; pedicels filiform, 13 mm. long; buds subglobose. Calyx deeply divided; segments 1.6 mm. long, lanceolate, acute. Corolla divided almost to the base; lobes 5 mm. long, lanceolate-deltoid, acute, 2.5 mm. broad at the base, spreading or reflexed; corona-lobes 2 mm. long, triangular, about equalling the column or a little shorter than it, acute at the apex, curving outwards to an acute base. Follicles 3.8-6.3 cm. long, tapering to a long point, glabrous, the valves much everted after dehiscence. Seeds 6 by 3 mm., ovate, narrowly margined, truncate at the apex, slightly crenulate at the base; coma 1.3-2 cm. long.

Distribution: Bengal, Pegu, W. Peninsula, Ceylon.

The plant is cooling and alterative.

Gujerati: Shingroti, Singroti, Surjavel—; *Hindi:* Ambarvel—; *Malayalam:* Parpparam—; *Marathi:* Shingrota—; *Sanskrit:* Shringariti, Suryavalli—; *Tamil:* Uppili—; *Telugu:* Chekurtitivva, Pulapala—.

PERGULARIA Linn. (non aliorum auct.)

Twining pubescent or tomentose undershrubs. Leaves opposite, cordate. Flowers medium sized, greenish white, in axillary racemose or corymbose pedunculate cymes; pedicels slender. Calyx 5-partite, 5-glandular, lobes acute. Corolla-tube short, campanulate or funnel-shaped; lobes 5, ovate, spreading, overlapping to the right in bud; corona double, the outer membranous, annular, 5-lobed, the lobes truncate or dentate, the inner of 5 erect, laterally compressed, lobes spurred at the base and produced above in long free often fimbriate tips curved over the style-apex. Stamens 5, adnate to the corolla-tube; filaments connate in a column; anther-appendages membranous, inflexed; pollen-masses waxy, pendulous, attached in pairs to the shining horny pollen-carriers without caudicles. Ovary of 2 distinct carpels; styles slender; style-apex slightly convex at top. Fruit of 2 lanceolate, acuminate, smooth or softly echinate, often recurved follicles. Seeds ovate, minutely pubescent, margined, ending in a silky white coma; cotyledons suborbicular, radicle pointed.—Species 15.—Africa and tropical Asia.

P. extensa N. E. Br. is used medicinally in the Gold Coast, Senegambia, and the Cameroons.

1. **Pergularia extensa** N. E. Br. in Fl. Cap. IV, I, 758.—*Daemia extensa* R. Br. in Mem. Wern. Soc. I (1811) 50; Wight Ic. t. 596.—PLATE 623 (under *Daemia extensa* R. Br.).

A perennial twining herb, fœtid when bruised and with much milky juice; stems clothed with spreading hairs. Leaves thin, 5-10 by 3.8-9 cm., broadly ovate or suborbicular, acuminate, glabrous or more or less shortly pubescent above, usually velvety pubescent beneath, the margins ciliate, base deeply cordate, the basal lobes semiorbicular; petioles 2-6.3 cm. long, pubescent. Flowers greenish yellow or dull white, in lateral cymes which are at first corymbose, afterwards racemose; peduncles pubescent, coming off from between the petioles, though not quite midway between them, 7.5-15 cm. long, or longer; pedicels capillary, 2-3.2 cm. long, pubescent; bracts minute, lanceolate, acute. Calyx pubescent, divided to the base; sepals 3 mm. long, ovate-lanceolate, acute, ciliate. Corolla-tube narrowly campanulate, 3 mm. long; lobes spreading, 6 mm. long, ovate-oblong, acute, ciliate; outer corona membranous, subquadrate, truncate; inner corona-lobes 5-8 mm. long, including the subulate thorns which are curved high over the staminal column, spur acute. Follicles reflexed, 5-7.5 by 1.3 cm., lanceolate, attenuated into a long beak, echinate with soft spines. Seeds 8-4 mm., ovate, truncate at the apex, densely velvety-pubescent on both sides, narrowly margined, crenate at the rounded base; coma 2.5-3.2 cm. long.

Distribution: Throughout India in the hotter parts, Ceylon.—Afghanistan.

The plant is pungent, cooling; anthelmintic, laxative, antipyretic; cures biliousness, "kapha", asthma, "tridosha", ulcers, useful in eye troubles, urinary discharges, leucoderma, strangury, uterine complaints, inflammations; facilitates parturition (Ayurveda).

The root bark mixed with cow's milk is used as a purgative in rheumatic cases in doses of 1 to 2 drachms.

The fresh leaves made into a pulp are used as a stimulating poultice in carbuncle, with good effect. A decoction is given as an anthelmintic.

DAEMIA R. BR.

Twining pubescent or tomentose perennial herbs or undershrubs. Leaves opposite, cordate. Flowers medium sized, in lateral racemose or corymbose pedunculate cymes. Calyx 5-partite, glandular inside. Corolla yellowish- or greenish- white; tube short, campanulate or cylindric; lobes 5, ovate, spreading, overlapping to the right in bud; corona double, the outer at the base of the staminal column, membranous, annular, shortly 5-lobed, the lobes subquadrate or oblong, obtuse, truncate or denticulate, the inner corona of 5 erect fleshy lobes spurred at the base, adnate to the staminal column up to the anthers, free above and produced into subulate horns incurved over the style-apex. Staminal column arising at the mouth of the corolla-tube; anthers erect, with a membranous inflexed appendage. Style-apex exserted; pollen-masses waxy, 1 in each anther-cell, compressed, attached in pairs to the pollen-carriers by their attenuated ends without caudicles. Follicles lanceolate, usually echinate. Seeds comose.— Species 4.— Palæotropics.

The genus is credited with anthelmintic properties.

1. **Daemia cordata** R. Br. in Mem.—*Pergularia tomentosa* Linn. Mantiss. 51. Wern. Soc. I (1811) 50.

Shrubby, appressedly tomentose all over. Old branches tortuose, the young ones scandent. Leaves petiolate, ovate or reniform, from the base much cordate, shortly acuminate. Umbels several-flowered. Peduncle longer than the leaf, finally thickened. Pedicels several times longer than the flower, margin of corolla ciliate, tube slightly longer than the calyx. Follicles hoary, covered with soft spines, attenuate above into a curved back. Seeds on the lower margin incised-crenate.

Distribution: Baluchistan.—Arabia, Egypt, Algeria, Nubia, Abyssinia.

The plant is used as an anthelmintic.

Kulanch: Shagosa—;

HOLOSTEMMA R. BR.

Twining glabrous shrubs. Leaves opposite, cordate. Flowers large, purple within, in sublateral lax few-flowered pedunculate cymes.

The plant is sweet; alterative, astringent to the bowels; cures ulcers, biliousness, "kapha", diseases of the blood, worms, itching, leucoderma; useful in gonorrhœa, and for vesicular calculi (Ayurveda).

In the Konkan, the roots are used as a remedy for scalding in gonorrhœa, and, beaten into a paste, are applied to the eyes in ophthalmia. In diabetes, the root rubbed to a paste is given in cold milk. In spermatorrhœa, the dried root, with an equal quantity of the root of *Ceiba pentandra* powdered, is given in 6 massa doses, with milk and sugar, twice daily.

Rheede first drew attention to the medicinal virtues of the root, mentioning its value as an application for ophthalmia.

It is employed in decoction by the Santals, as a remedy for cough, and also for orchitis. It is also a Munda stomach-ache medicine.

Bombay: Dudurli, Sidori, Tultuli—; *Gujerati:* Kharner, Khiravel—; *Hindi:* Chhirvel—; *Kolami:* Apung—; *Malayalam:* Atakkoti—; *Marathi:* Dudurli, Shidodi, Shirdooli, Sidodi, Tulatule—; *Mundari:* Apung, Konggadnari—; *Porebunder:* Khaner, Khiran—; *Sanskrit:* Arkapushpi, Duradharsha, Jalakamuka, Jaleruha, Jivanti, Krurakarma, Kshiradodi, Kshirini, Kutumbini, Payasya, Praharakutavi, Shita, Shitala, Shitaparni, Sirintika, Sitaparni, Suryavalli. Vakrashalya—; *Santal:* Apung, Morouraak—; *Telugu:* Dudipalatige, Palagurugu—.

CYNANCHUM Linn.

Herbs or shrubs, erect or twining. Leaves opposite. Flowers small, in sessile or pedunculate corymbose or umbellate cymes or racemes, which are lateral or subaxillary. Calyx 5-partite. Corolla rotate or campanulate, 5-partite; lobes overlapping to the right or valvate; corona often membranous, arising from the staminal column near or at its base, annular, cupular or tubular, toothed or lobed at the top or divided more or less deeply into 5 entire or toothed lobes. Staminal column arising at or near the base of the corolla; anthers with a membranous tip; pollen-masses 1 in each cell, pendulous, attached by a short or long caudicle to the pollen-carriers. Style-apex truncate, conical or rostrate. Follicles smooth, winged or entire. Species 120.—Tropical and temperate.

C. caudatum Maxim., *C. japonicum* Morr. & Decne., *C. japonicum* Morr. & Decne. var. *purpurascens* Maxim. are used medicinally in China; *C. capense* Thunb. is used in South Africa.

1. **Cynanchum arnottianum** Wight. Contrib. 58.—*Vincetoxicum Arnottianum* Wight Ic. t. 1614.

Stem erect, puberulous or hoary. Leaves ovate, oblong or lanceolate, sometimes whorled. Cymes sessile, corolla dark purple, segments hirsute or bearded within, coronal lobes 5 fleshy oblong or rounded.

Distribution: Baluchistan, Kashmir.

The leaves are dried in the shade, not in the sun, and ground to powder. They are then applied to wounds on animals in which there are maggots, and the maggots die (Hotson).

Baluchistan: Bhankalink—; *Brahui:* Jaurikani, Kuri—.

SARCOSTEMMA R. Br.

Leafless trailing or twining jointed shrubs with pendulous branches. Flowers small, in sessile umbels which are terminal or lateral from the nodes. Calyx 5-partite. Corolla rotate or subcampanulate, deeply divided; lobes 5, overlapping to the right in bud; corona double, arising from the staminal column, the outer annular or cup-shaped, often pentagonal, truncate or shortly lobed, the inner corona of 5 erect fleshy compressed or keeled lobes with their basal part embraced by the outer corona. Staminal column arising from the base of the corolla; anthers with membranous inflexed or suberect appendages; pollen-masses pendulous, 1 in each cell, attached in pairs by short or long slender caudicles to the pollen-carriers. Style-apex shortly conical or oblong-fusiform, included or exserted. Follicles smooth. Seeds comose.—Species 12.—Tropics and subtropics of the Old World.

A. Umbels terminal. Style-apex short, conical not exserted
  1. Follicles tapering to both ends, slightly divergent ...... 1. *S. brevistigma.*
  2. Follicles straight, rod-like, not tapering towards the base and but little towards the apex, much divaricate .... 4. *S. stocksii.*

B. Umbels terminal and lateral. Style-apex oblong, fusiform, much exserted .... 3. *S. intermedium.*
C. Umbels chiefly lateral .... 2. *S. brunonianum.*

S. glaucum H. B. K. is used medicinally in Venezuela; *S. viminale* R. Br. in South Africa, La Reunion and Madagascar.

The milky juice of *S. viminale* R. Br. will instantly allay the intense pain caused by the entrance into the eye of the juice of any Euphorbiaceous plant.

1. **Sarcostemma brevestigma** Wight Contrib. (1834) 59; Wight Ic. t. 595.—PLATE 625.

Stems 3-6 mm. diam., green, glabrous; joints 10-20 cm. long. Flowers in sessile many-flowered terminal umbels; pedicles 6-8 mm. long, slender, pubescent; bracts minute, lanceolate. Calyx divided to the base or nearly so, with glands inside; segments 1.25 mm. long, ovate-oblong, subacute, with membranous margins. Corolla campanulate, pale greenish white, divided nearly to the base; lobes 5 mm. long, ovate-oblong, subacute; outer corona crenately 10-lobed on the margin; lobes of the inner corona thick, fleshy, obtuse, longer than the staminal column almost concealing the anthers. Staminal column very short; pollen-masses waxy, compressed, clavate, slightly curved, attached by a very short caudicle to the pollen-carriers. Style-apex very shortly conical or blunt. Follicles 10-12.5 by 0.8 cm., lanceolate, tapering to both ends, straight, slightly diverging when two together. Seeds 5 by 3 mm., ovate, flattened, coma 2 cm. long.

Distribution: Bengal, Chota Nagpur, Burma, Konkan, Deccan, N. Circars, Carnatic.

The plant is bitter; cooling, alterative; cures "tridosha" biliousness, thirst (Ayurveda).

The dried stem has emetic properties.

Bengal: Soma, Somlata—; *Bombay:* Lama, Soma—; *Canarese:* Brahmi, Hambukalli, Somaballi, Somalate, Vasukanti—; *English:* Moon Creeper, Moon Plant, Sour Creeper—; *Gujerati:* Somvel—; *Hindi:* Somlata—; *Koya:* Kadujemudu—; *Malayalam:* Somam, Somavallari, Somavalli, Vayastha—; *Marathi:* Ransher, Ransheryel, Somyel—; *Mundari:* Kulatoa—; *Porebunder:* Chirodi, Sandhiavel,

Thoravel—; *Sanskrit:* Chandravallari, Dhanurlata, Dvijapriya, Gulmavalli, Indulekha, Mahagulma, Padmakashtha, Soma, Somakshiri, Somalata, Somarha, Somavalli, Somavallika, Yajnanga, Yajnashreshtha, Yajnavalli—; *Sind:* Thorinjal—; *Sinhalese:* Muwakiriya—; *Tamil:* Kodikkalli, Somam—; *Telugu:* Kondapala, Padmakashtamu, Pullajemudu, Pollatige, Somalata, Tigejemudu—; *Uriya:* Borohwi, Notasiju, Somolota—.

2. **Sarcostemma brunonianum** W. & A. in Wight Contrib. 59; Wight Ic. t. 1282; Bot. Mag. t. 6002.

A perennial herb, often semi-shrubby at base, stems very long, slender, cylindrical, jointed, fleshy, glabrous, dark green, scrambling over other plants but scarcely twining, divaricately branched. Leaves none. Cymes at the nodes; flowers on short puberulous pedicels. Calyx-segments acute, pubescent; corolla about 13 mm. diam., lobes oblong-oval, obtuse or subacute, margin revolute; follicles 8.8 cm., gradually tapering to a sharp point, glabrous.

Distribution: S. India, Ceylon.

Indian herbalists do not consider this plant specifically distinct from *S. brevistigma.*

Sinhalese: Muroakiriya—.

3. **Sarcostemma intermedium** Dcne. in DC. Prodr. VIII (1844) 538; Wight Ic. t. 1281.

Twining. Flowers in terminal and lateral sessile umbels. Calyx puberulous outside, divided to the base or nearly so; segments 1.25 mm. long, ovate-oblong, subacute. Corolla white, divided nearly to the base; lobes 6 mm. long, oblong, obtuse; outer corona with 10 obtuse lobes on the margin; lobes of the inner corona rather thin, not fleshy, oblong, subacute. Staminal column elongate; pollen-masses waxy, clavate, compressed, attached by rather long caudicles to the pollen-carriers. Style-apex oblong-fusiform, much exserted beyond the anthers. Follicles 7.5-10 cm. long, not narrowed at the base, narrowed towards the tip, not divaricate when two together. Seeds 5-6 by 2.5-3 mm., oblong, flattened, rounded at the base, truncate at the apex; coma 2 cm. long.

Distribution: W. Peninsula.

The plant is credited with the same medicinal properties as *S. brevistigma*.

Canarese: Konadaballi, Soma—; *Malayalam:* Jivanti, Jivati—; *Tamil:* Kodikkalli—; *Telugu:* Pullatige, Somalata, Tigejemudu—.

4. **Sarcostemma stocksii** Hook. f. Fl. Brit. Ind. IV (1883) 27.

Stems 3-6 mm. diam., green, glabrous. Flowers in terminal umbels exactly as in Sarcostemma brevistigma. Follicles 5.6-7.5 cm. long, straight, cylindric, almost the same breadth throughout except towards the subacute apex, widely divaricate, so much so that both follicles are sometimes in one horizontal straight line. Seeds 6 by 2.5 mm., narrowly oblong, truncate at the apex, somewhat attenuated towards the base; coma 2.5 cm. long.

Distribution: Sind, S. M. Country.

Indian herbalists do not consider this plant specifically distinct from *S. brevistigma*.

GYMNEMA R. Br.

Twining shrubs. Leaves opposite. Flowers small, in crowded lateral umbellate cymes. Calyx 5-partite. Corolla subrotate, campanulate or urceolate, divided to the middle or beyond it; lobes thick, overlapping to the right in bud; corona arising from and adnate to the corolla-tube, either of 5 fleshy lobes adnate up to the mouth of the corolla-tube with more or less incurved tips, or of 5 pairs of fleshy ridges on the lower part of the tube alternating with the corolla-lobes. Staminal column arising from the base of the corolla; anthers short, erect, with short membranous appendages; pollen-masses erect, solitary in each anther-cell. Style-apex often exserted beyond the anthers. Follicles smooth. Seeds comose.—Species 40.—W. Africa to Australia.

The genus is therapeutically inactive.

The juice of the leaves is used as an expectorant in the treatment of catarrhal affections; it is given in asthma, and applied to rheumatic swellings in combination with lime or ginger.

The juice is also used in the preparation of a purgative medicinal oil given in rheumatism, amenorrhœa, and dysmenorrhœa.

In Western India, the plant has a general reputation as an expectorant and emetic. Certainly valuable as an emetic with infants; the leaves are washed, and the juice expressed by rubbing between the palms of the hands; the leaves of the dark Toolsi are similarly treated, and then a mixture of the juice is given: this preparation is a stimulating emetic.

It is also used in infantile diarrhœa.

In the Gold Coast, the juice of the leaves is squeezed into sore eyes, which it is said to cure. The leaves are chopped up and mixed with peppers and given to sick young turkeys to cure diarrhœa. It is also reputed to be a good cure for cough. The stem is put in the fire for a short time and then it is chewed and the juice is swallowed.

This drug was strongly recommended for malarial intermittent fevers. The juice of the leaves in half ounce doses as advised was administered to a few cases of malaria without any beneficial effect (Koman).

The decoction and juice of the leaves is reputed to be a cure for snake-bite; but they are both equally useless (Mhaskar and Caius).

Awuna: Kponkeki—; *Bengal:* Chagulbanti—; *Bombay:* Utarni—; *Canarese:* Belihatti, Halkoratige,, Juttuveballi, Kuntalige, Taravaranaballi, Ugurusuttuballi—; *Deccan:* Jutuk, Jutup, Utarni, Utran—; *Ewe:* Kponkeki—; *Ga:* Kaba—; *Gujarati:* Amaradudheli, Nagaladudhi—; *Hindi:* Jutuk, Sadowani, Utran—; *Las Bela:* Akohro—; *Malayalam:* Veliparutti—; *Marathi:* Mendhadudhi, Utarana—; *Punjab:* Karial, Siali, Trotu—; *Sanskrit:* Chandaladugdhika, Uttaravaruni, Vishanika, Yugaphala, Yugmaphala, Yugmaphalika—; *Sind:* Kharial, Utarana—; *Tamil:* Achanimuli, Anjanimuli, Kudagaram, Nandamani, Uttamadali, Sidavaram, Siriyattini, Siyachini, Uttamagani, Uttamani, Velipparutti—; *Telugu:* Dushtupatige, Guruti, Juttupakku—; *Twi:* Nsurogya—; *Uriya:* Juktiruhi, Uttururi—.

DAEMIA R. Br.

Twining pubescent or tomentose perennial herbs or undershrubs. Leaves opposite, cordate. Flowers medium sized, in lateral racemose or corymbose pedunculate cymes. Calyx 5-partite, glandular inside. Corolla yellowish- or greenish- white; tube short, campanulate or cylindric; lobes 5, ovate, spreading, overlapping to the right in bud; corona double, the outer at the base of the staminal column, membranous, annular, shortly 5-lobed, the lobes subquadrate or oblong, obtuse, truncate or denticulate, the inner corona of 5 erect fleshy lobes spurred at the base, adnate to the staminal column up to the anthers, free above and produced into subulate horns incurved over the style-apex. Staminal column arising at the mouth of the corolla-tube; anthers erect, with a membranous inflexed appendage. Style-apex exserted; pollen-masses waxy, 1 in each anther-cell, compressed, attached in pairs to the pollen-carriers by their attenuated ends without caudicles. Follicles lanceolate, usually echinate. Seeds comose.—Species 4.—Palæotropics.

The genus is credited with anthelmintic properties.

1. **Daemia cordata** R. Br. in Mem.—*Pergularia tomentosa* Linn. Mantiss. 51. Wern. Soc. I (1811) 50.

Shrubby, appressedly tomentose all over. Old branches tortuose, the young ones scandent. Leaves petiolate, ovate or reniform, from the base much cordate, shortly acuminate. Umbels several-flowered. Peduncle longer than the leaf, finally thickened. Pedicels several times longer than the flower, margin of corolla ciliate, tube slightly longer than the calyx. Follicles hoary, covered with soft spines, attenuate above into a curved back. Seeds on the lower margin incised-crenate.

Distribution: Baluchistan.—Arabia, Egypt, Algeria, Nubia, Abyssinia.

The plant is used as an anthelmintic.

Kulanch: Shagosa—;

HOLOSTEMMA R. Br.

Twining glabrous shrubs. Leaves opposite, cordate. Flowers large, purple within, in sublateral lax few-flowered pedunculate cymes.

Calyx 5-partite, not glandular inside; segments ovate. Corolla thick, subrotate, deeply 5-fid; lobes overlapping to the right; corona arising from the base of the staminal column and adnate thereto, annular, fleshy, truncate. Staminal column arising from the base of the corolla; filaments connate; anther-wings large, decurrent to the base of the column; pollen-masses 1 in each cell, elongate, compressed, pendulous by a long caudicle from a attenuated apex. Style-apex scarcely umbonate. Follicles slender, cylindric, slightly tapering.—Species 3.—Indo-Malaya, China.

The genus is not therapeutically defined.

1. **Holostemma annulare** K. Schum. in Engl. and Prantl. Naturl. Pflanzenfam. IV, 2 (1895) 250.—*H. Rheedianum* Spreng. Syst. I (1825) 851.—Plate 624 (under *H. Rheedii* Wall.).

A large glabrous twining shrub; stems much-branched, glabrous, shining. Leaves 7.5-12.5 by 5-7.5 cm., thick, ovate-oblong, acuminate, glabrous above, more or less pubescent(especially on the nerves) and reticulately veined beneath, base deeply cordate, with rounded lobes, often with a few small glands at the base of the midrib above; petioles 2.5-5 cm. long, stout, glabrous. Flowers fragrant, edible, purplish crimson inside, frosted white or pale pink outside, in sub-lateral few-flowered cymes; peduncles 2.5-5 cm. long, arising close to the base of the petiole outside the leaf-axil; pedicels as long as the peduncles. Calyx divided nearly to the base; segments 5 mm. long, broadly ovate, obtuse, veined. Corolla subrotate, divided about $^2/_3$ of the way down; lobes 1.3 by 1 cm., ovate-oblong, obtuse, overlapping to the right; corona arising from the base of the staminal column, consisting of a fleshy truncate ring 2.5 mm. high. Anthers large, with large stiff wings and with membranous tips inflexed over the column; pollen-masses 1.5 mm. long, waxy, compressed, linear-clavate, slightly curved, pendulous from the linear pollen-carriers by black caudicles 1.25 mm. long. Follicles 10-12.5 by 0.6 cm., linear-oblong, cylindric, slightly tapering to a blunt point. Seeds 6 mm. long, oblong, very thin, much flattened, somewhat truncate and not crenate at the base; coma 2-2.5 cm. long.

Distribution: Tropical Himalaya, Burma, W. Peninsula, Ceylon.—China.

The plant is sweet; alterative, astringent to the bowels; cures ulcers, biliousness, "kapha", diseases of the blood, worms, itching, leucoderma; useful in gonorrhœa, and for vesicular calculi (Ayurveda).

In the Konkan, the roots are used as a remedy for scalding in gonorrhœa, and, beaten into a paste, are applied to the eyes in ophthalmia. In diabetes, the root rubbed to a paste is given in cold milk. In spermatorrhœa, the dried root, with an equal quantity of the root of *Ceiba pentandra* powdered, is given in 6 massa doses, with milk and sugar, twice daily.

Rheede first drew attention to the medicinal virtues of the root, mentioning its value as an application for ophthalmia.

It is employed in decoction by the Santals, as a remedy for cough, and also for orchitis. It is also a Munda stomach-ache medicine.

Bombay: Dudurli, Sidori, Tultuli—; *Gujerati:* Kharner, Khiravel—; *Hindi:* Chhirvel—; *Kolami:* Apung—; *Malayalam:* Atakkoti—; *Marathi:* Dudurli, Shidodi, Shirdooli, Sidodi, Tulatule—; *Mundari:* Apung, Konggadnari—; *Porebunder:* Khaner, Khiran—; *Sanskrit:* Arkapushpi, Duradharsha, Jalakamuka, Jaleruha, Jivanti, Krurakarma, Kshiradodi, Kshirini, Kutumbini, Payasya, Praharakutavi, Shita, Shitala, Shitaparni, Sirintika, Sitaparni, Suryavalli. Vakrashalya—; *Santal:* Apung, Morouraak—; *Telugu:* Dudipalatige, Palagurugu—.

CYNANCHUM Linn.

Herbs or shrubs, erect or twining. Leaves opposite. Flowers small, in sessile or pedunculate corymbose or umbellate cymes or racemes, which are lateral or subaxillary. Calyx 5-partite. Corolla rotate or campanulate, 5-partite; lobes overlapping to the right or valvate; corona often membranous, arising from the staminal column near or at its base, annular, cupular or tubular, toothed or lobed at the top or divided more or less deeply into 5 entire or toothed lobes. Staminal column arising at or near the base of the corolla; anthers with a membranous tip; pollen-masses 1 in each cell, pendulous, attached by a short or long caudicle to the pollen-carriers. Style-apex truncate, conical or rostrate. Follicles smooth, winged or entire. Species 120.—Tropical and temperate.

C. caudatum Maxim., *C. japonicum* Morr. & Decne., *C. japonicum* Morr. & Decne. var. *purpurascens* Maxim. are used medicinally in China; *C. capense* Thunb. is used in South Africa.

1. **Cynanchum arnottianum** Wight. Contrib. 58.—*Vince-toxicum Arnottianum* Wight Ic. t. 1614.

Stem erect, puberulous or hoary. Leaves ovate, oblong or lanceolate, sometimes whorled. Cymes sessile, corolla dark purple, segments hirsute or bearded within, coronal lobes 5 fleshy oblong or rounded.

Distribution: Baluchistan, Kashmir.

The leaves are dried in the shade, not in the sun, and ground to powder. They are then applied to wounds on animals in which there are maggots, and the maggots die (Hotson).

Baluchistan: Bhankalink—; *Brahui:* Jaurikani, Kuri—.

SARCOSTEMMA R. Br.

Leafless trailing or twining jointed shrubs with pendulous branches. Flowers small, in sessile umbels which are terminal or lateral from the nodes. Calyx 5-partite. Corolla rotate or sub-campanulate, deeply divided; lobes 5, overlapping to the right in bud; corona double, arising from the staminal column, the outer annular or cup-shaped, often pentagonal, truncate or shortly lobed, the inner corona of 5 erect fleshy compressed or keeled lobes with their basal part embraced by the outer corona. Staminal column arising from the base of the corolla; anthers with membranous inflexed or suberect appendages; pollen-masses pendulous, 1 in each cell, attached in pairs by short or long slender caudicles to the pollen-carriers. Style-apex shortly conical or oblong-fusiform, included or exserted. Follicles smooth. Seeds comose.—Species 12.—Tropics and subtropics of the Old World.

A. Umbels terminal. Style-apex short, conical not exserted
  1. Follicles tapering to both ends, slightly divergent ...... 1. *S. brevistigma.*
  2. Follicles straight, rod-like, not tapering towards the base and but little towards the apex, much divaricate .... 4. *S. stocksii.*

B. Umbels terminal and lateral. Style-apex oblong, fusiform, much exserted .... 3. *S. intermedium.*
C. Umbels chiefly lateral .... 2. *S. brunonianum.*

S. glaucum H. B. K. is used medicinally in Venezuela; *S. viminale* R. Br. in South Africa, La Reunion and Madagascar.

The milky juice of *S. viminale* R. Br. will instantly allay the intense pain caused by the entrance into the eye of the juice of any Euphorbiaceous plant.

1. **Sarcostemma brevestigma** Wight Contrib. (1834) 59; Wight Ic. t. 595.—PLATE 625.

Stems 3-6 mm. diam., green, glabrous; joints 10-20 cm. long. Flowers in sessile many-flowered terminal umbels; pedicles 6-8 mm. long, slender, pubescent; bracts minute, lanceolate. Calyx divided to the base or nearly so, with glands inside; segments 1.25 mm. long, ovate-oblong, subacute, with membranous margins. Corolla campanulate, pale greenish white, divided nearly to the base; lobes 5 mm. long, ovate-oblong, subacute; outer corona crenately 10-lobed on the margin; lobes of the inner corona thick, fleshy, obtuse, longer than the staminal column almost concealing the anthers. Staminal column very short; pollen-masses waxy, compressed, clavate, slightly curved, attached by a very short caudicle to the pollen-carriers. Style-apex very shortly conical or blunt. Follicles 10-12.5 by 0.8 cm., lanceolate, tapering to both ends, straight, slightly diverging when two together. Seeds 5 by 3 mm., ovate, flattened, coma 2 cm. long.

Distribution: Bengal, Chota Nagpur, Burma, Konkan, Deccan, N. Circars, Carnatic.

The plant is bitter; cooling, alterative; cures "tridosha" biliousness, thirst (Ayurveda).

The dried stem has emetic properties.

Bengal: Soma, Somlata—; *Bombay:* Lama, Soma—; *Canarese:* Brahmi, Hambukalli, Somaballi, Somalate, Vasukanti—; *English:* Moon Creeper, Moon Plant, Sour Creeper—; *Gujerati:* Somvel—; *Hindi:* Somlata—; *Koya:* Kadujemudu—; *Malayalam:* Somam, Somavallari, Somavalli, Vayastha—; *Marathi:* Ransher, Ransheryel, Somyel—; *Mundari:* Kulatoa—; *Porebunder:* Chirodi, Sandhiavel,

Thoravel—; *Sanskrit:* Chandravallari, Dhanurlata, Dvijapriya, Gulmavalli, Indulekha, Mahagulma, Padmakashtha, Soma, Somakshiri, Somalata, Somarha, Somavalli, Somavallika, Yajnanga, Yajnashreshtha, Yajnavalli—; *Sind:* Thorinjal—; *Sinhalese:* Muwakiriya—; *Tamil:* Kodikkalli, Somam—; *Telugu:* Kondapala, Padmakashtamu, Pullajemudu, Pollatige, Somalata, Tigejemudu—; *Uriya:* Borohwi, Notasiju, Somolota—.

2. **Sarcostemma brunonianum** W. & A. in Wight Contrib. 59; Wight Ic. t. 1282; Bot. Mag. t. 6002.

A perennial herb, often semi-shrubby at base, stems very long, slender, cylindrical, jointed, fleshy, glabrous, dark green, scrambling over other plants but scarcely twining, divaricately branched. Leaves none. Cymes at the nodes; flowers on short puberulous pedicels. Calyx-segments acute, pubescent; corolla about 13 mm. diam., lobes oblong-oval, obtuse or subacute, margin revolute; follicles 8.8 cm., gradually tapering to a sharp point, glabrous.

Distribution: S. India, Ceylon.

Indian herbalists do not consider this plant specifically distinct from *S. brevistigma.*

Sinhalese: Muroakiriya—.

3. **Sarcostemma intermedium** Dcne. in DC. Prodr. VIII (1844) 538; Wight Ic. t. 1281.

Twining. Flowers in terminal and lateral sessile umbels. Calyx puberulous outside, divided to the base or nearly so; segments 1.25 mm. long, ovate-oblong, subacute. Corolla white, divided nearly to the base; lobes 6 mm. long, oblong, obtuse; outer corona with 10 obtuse lobes on the margin; lobes of the inner corona rather thin, not fleshy, oblong, subacute. Staminal column elongate; pollen-masses waxy, clavate, compressed, attached by rather long caudicles to the pollen-carriers. Style-apex oblong-fusiform, much exserted beyond the anthers. Follicles 7.5-10 cm. long, not narrowed at the base, narrowed towards the tip, not divaricate when two together. Seeds 5-6 by 2.5-3 mm., oblong, flattened, rounded at the base, truncate at the apex; coma 2 cm. long.

Distribution: W. Peninsula.

The plant is credited with the same medicinal properties as *S. brevistigma.*

Canarese: Konadaballi, Soma—; *Malayalam:* Jivanti, Jivati—; *Tamil:* Kodikkalli—; *Telugu:* Pullatige, Somalata, Tigejemudu—.

4. **Sarcostemma stocksii** Hook. f. Fl. Brit. Ind. IV (1883) 27.

Stems 3-6 mm. diam., green, glabrous. Flowers in terminal umbels exactly as in Sarcostemma brevistigma. Follicles 5.6-7.5 cm. long, straight, cylindric, almost the same breadth throughout except towards the subacute apex, widely divaricate, so much so that both follicles are sometimes in one horizontal straight line. Seeds 6 by 2.5 mm., narrowly oblong, truncate at the apex, somewhat attenuated towards the base; coma 2.5 cm. long.

Distribution: Sind, S. M. Country.

Indian herbalists do not consider this plant specifically distinct from *S. brevistigma.*

Gymnema R. Br.

Twining shrubs. Leaves opposite. Flowers small, in crowded lateral umbellate cymes. Calyx 5-partite. Corolla subrotate, campanulate or urceolate, divided to the middle or beyond it; lobes thick, overlapping to the right in bud; corona arising from and adnate to the corolla-tube, either of 5 fleshy lobes adnate up to the mouth of the corolla-tube with more or less incurved tips, or of 5 pairs of fleshy ridges on the lower part of the tube alternating with the corolla-lobes. Staminal column arising from the base of the corolla; anthers short, erect, with short membranous appendages; pollen-masses erect, solitary in each anther-cell. Style-apex often exserted beyond the anthers. Follicles smooth. Seeds comose.—Species 40.—W. Africa to Australia.

The genus is therapeutically inactive.

1. **Gymnema sylvestre** R. Br. in Mem. Wern. Soc. I (1811) 33; Wight Ic. t. 349.—PLATE 626.

A large woody much-branched climber running over the tops of high trees; young stems and branches pubescent, often densely so, terete. Leaves 3.2-5 by 1.3-3.2 cm., ovate, elliptic, or ovate-lanceolate, acute or shortly acuminate, more or less pubescent on both sides, sometimes densely so beneath, especially on the nerves, base rounded or cordate, sometimes cuneate; petioles 6-13 mm. long, pubescent. Flowers in pedunculate or nearly sessile cymes; peduncles densely pubescent, shorter than the petioles and arising from between them, sometimes producing successive umbels or whorls of flowers; pedicels 3-13 mm. long, pubescent; bracts minute, ovate-oblong, hairy ciliate. Calyx pubescent, divided to the base or nearly so; segments 2 mm. long, oblong, obtuse, ciliolate. Corolla yellow, 4-5 mm. across; tube campanulate, 1.5 mm. long, about equalling the lobes; lobes thick, ovate-deltoid, spreading, recurved, glabrous; corona of 5 processes inserted on the corolla-tube, alternate with its lobes, free at the short deltoid subacute tip which protrudes above the sinus, the lower adnate portion decurrent, channelled and with strongly ciliate margins. Style-apex thick, subhemispherical, much exserted beyond the anthers, pearly white. Follicles 6.3-7.5 by 0.8 cm., terete, rigid. lanceolate, attenuated into a beak, glabrous, one follicle often suppressed. Seeds 1.3 cm. long, narrowly ovoid-oblong, flat, with a thin broad marginal wing, brown, glabrous.

Distribution: Banda, Konkan, S. M. Country, W. Ghats, N. Kanara, N. Circars, Carnatic, Deccan, Ceylon.—Tropical Africa.

The plant is bitter, acrid; cooling, tonic, alterative, anthelmintic, alexiteric; useful in eye complaints, cures opacities of the lens, cornea, and vitreous body; good in diseases of the heart, piles, leucoderma, inflammations; cures burning sensation, biliousness, bronchitis, asthma, ulcers.—The fruit is bitter, pungent, heating, stomachic, anthelmintic, alexiteric; good in diseases of the heart, urinary discharges, bronchitis, ulcers (Ayurveda).

The jungle Irulas inhabiting the Nagari Hills of the North Arcot District are in the habit of chewing a few green leaves in the morning in order to keep their urine clear.

Among the bourgeois classes of Bombay and Gujarat the custom exists of chewing the fresh leaves to reduce glycosuria. So great is the belief in the efficacy of the drug that not a few grow the plant in their garden.

In Bombay and Madras, vaids are known to recommend the leaves in the treatment of furunculosis and 'Madhumeha' (=glycosuria).

The root is in esteem amongst the Hindus as a local and internal remedy in snake-bites; is also said to possess emetic and expectorant properties.

In the Konkan, the dried and powdered leaf is used as an errhine.

" 1. The root and leaves are useless in the antidotal treatment of snake-bite. The root is also useless when used as an errhine or applied to the part bitten.

" 2. The leaves cause hypoglycæmia which sets in soon after the administration of the drug whether by mouth or by injection, lasts for a variable time, is not necessarily proportionate to the dose and is never excessive. They do not contain any water-soluble or alcohol-soluble substance which destroys glucose *in vitro;* nor do they yield any chemical body resembling insulin. The drug has no direct action on carbohydrate metabolism, and acts indirectly through stimulation of insulin secretion of the pancreas. It stimulates the heart and circulatory system, and increases urine secretion. The presence of anthraquinone derivatives accounts for its laxative action.

" 3. The ease of administration, the stomachic, stimulant diuretic, and laxative properties together with their mineral content mark the leaves as a " prescription " for the treatment of glycosuria. We recommend 2 to 4 grammes of dry leaf per day in divided doses (Mhaskar and Caius)."

Arabic: Barkista—; *Bengal:* Gadalshingi, Medashinge, Meshasingi—; *Bombay:* Kavali, Wakandi—; *Canarese:* Sannagera, Sannagerasehambu, Sennagerse, Uriyamare—; *Deccan:* Perpatrah—; *English:* Periploca of the Woods, Small Indian Ipecacuanha—; *German:* Wald Schlinge—; *Gujerati:* Dhuleti, Mardashingi—; *Hindi:* Chhotadudhilata, Gurmar, Medhashingi, Merasingi, Meshasingi—;

Katagum: Yaryadin kura—; *Konkani:* Ranmogra—; *Marathi:* Bedaki, Bedakuli, Kalikardori, Kaoli, Kavali, Madphali, Parapatraha, Vakhande, Vakundi—; *Persian:* Kakarsingi, Kakrasingi, Kista—; *Sanskrit:* Ajaballi, Ajaghandini, Ajashrangi, Ajashringi, Ajashringika, Akshibheshaja, Anyada, Avartini, Bahalchakshu, Bishani, Bisharni, Chakrashreni, Chakshu, Chakshurbahala, Chakshushya, Grihadruma, Karnika, Kshinavartta, Maurvi, Medashrangi, Medhasingi, Medhrashingi, Meghaballi, Mendhasingi, Mesharingi, Meshashrangi, Meshashringi, Meshavalli, Meshavishanika, Nandivruksha, Netraushadhi, Putrashringi, Sarpadanshtrika, Sarpadarushtrika, Tiktadughdha, Vartika, Vishani, Vishanika, Vrikshikali—; *Saora:* Puttapodara—; *Sinhalese:* Binnuge, Masbedde—; *Tamil:* Adigam, Amudupushpam, Ayagam, Kogilam,, Shagasharam, Shirukurinja, Sirukurunja—; *Telugu:* Podapatri, Putlapodra—; *Urdu:* Kakarsingi, Kakrasingi, Mendhasingi—.

Marsdenia R. Br.

Twining rarely erect shrubs. Leaves opposite. Flowers medium sized or small, in umbellate cymes or in small sessile umbels or clusters scattered along the branches of the cymes or panicles which are lateral or axillary. Calyx 5-partite. Corolla subcampanulate; lobes 5, overlapping to the right; corona of 5 erect fleshy lobes arising from and with their basal portion adnate to the staminal column, the apical portion free, applied to the backs of the anthers. Staminal column arising from or near the base of the corolla; anthers erect, with membranous appendages more or less incumbent on the top of the style; pollen-masses erect, 1 in each anther-cell, attached in pairs to the pollen-carriers by short or long moderately stout caudicles. Style-apex depressed, convex, conical or produced into a beak. Follicles with a thick pericarp, smooth, sometimes winged. Seeds comose.—Species 100.—Tropics and subtropics.

M. erecta R. Br. is used medicinally in Syria, *M. racemosa* K. Schum. in the Gold Coast, *M. Reichenbachii* Triana in South America.

OFFICIAL:—The bark of *Marsdenia spp.* (Holland); *M. Condurango* Nichols (Norway),—Reichenbach fil. (Austria, Belgium, Denmark, Hungary, Japan, Russia, Turkey); *M. Cundurango* Nichols (Spain)=*Gonolobus Condurango* Triana (Italy); *M. cundurango* Reichenbach fil. (Germany, Sweden, Switzerland).

1. **Marsdenia roylei** Wight Contrib. 40.—PLATE 618C.

A climber with dextrorse stems up to 7.5 m. high and 3.8 cm. diam. Bark pale brown, rough, corky and deeply fissured on old stems. Blaze 3.8-7.5 mm., rather fibrous, white streaked with pale orange, exuding milky juice. Twigs pale, with conspicuous lenticels, pubescent or tomentose. Leaves 10-18 by 6.3-12.5 cm., ovate, acuminate, base cordate, pubescent on both surfaces, dull green above; basal nerves 3-5, lateral nerves 3-5 pairs above the basal, prominent beneath. Petiole 3.8-9 cm. long, terete, tomentose. Flowers 7.5 mm. diam., orange-red, in compact, many-flowered, erect, pedunculate, extra-axillary cymes 2.5-5 cm. across. Peduncles 1.3-3.8 cm. long, stout, tomentose. Pedicels 2.5-5 mm. long, tomentose. Corolla campanulate, pubescent without, villous within. Corona of 5 slender subulate processes with free, erect, converging tips much exceeding the anthers. Follicles solitary, 7.5 by 2.5 cm., straight, beaked, hairy with thick deeply wrinkled pericarp.

Distribution: Western and Eastern Himalaya.

The unripe fruit is powdered and given as a cooling medicine. A decoction is used as a remedy in gonorrhœa.

Almora: Murkhila—; *Chenab:* Pathor—; *Dehra Dun:* Maruabel—; *Himalayan Districts:* Murkula—; *Jaunsar:* Kharchu—; *Kumaon:* Murkila—; *Salt Range:* Tar, Veri—; *Simla:* Kurang—.

LEPTADENIA R. Br.

Erect or twining shrubs with much-branched rush-like stems Leaves opposite, variable in the same species, sometimes absent. Flowers small, in umbellate lateral sessile or pedunculate many-flowered cymes. Calyx more or less deeply 5-fid. Corolla deeply divided, rotate or with a very short campanulate tube; lobes 5,

pubescent or bearded inside, valvate in bud; corona double, the corolline of 5 short transverse or rounded fleshy lobes tipped with a tuft of hairs or with a subulate hairy point, inserted at the sinuses of the corolla, the staminal corona of a raised undulate fleshy ring at the base of the staminal column. Staminal column arising from the base of the corolla; anthers incumbent on the top of the style, without terminal appendages; pollen-masses 1 in each anther-cell, suberect, pellucid at the apex, attached in pairs by short caudicles to the pollen-carriers. Follicles smooth. Seeds comose.—Species 15. —Africa, Asia.

L. lancifolia Decne. is used medicinally in Togoland.

1. **Leptadenia reticulata** Wight and Arn. in Wight Contrib. (1834) 47; Wight Ic. 350.—*Asclepias tuberosa* Roxb. Fl. Ind. I (1832) 38.

A twining shrub; stems with corky deeply cracked bark; branches numerous, the younger ones terete, glabrous or hoary-puberulous. Leaves thinly coriaceous, 3.8-7.5 by 2-4.5 cm., ovate, acute, glabrous above, more or less finely pubescent (especially on the nerves) beneath, base rounded or subcordate (rarely subacute); petioles 6-20 mm. long, puberulous. Flowers greenish-yellow, in lateral or subaxillary many-flowered hoary-puberulous globose cymes; peduncles arising from between the leaves or subaxillary, sometimes in pairs, puberulous; pedicels 3-4 mm. long, puberulous. Calyx pubescent outside, divided to about the middle; segments 1.25 mm. long, ovate-oblong, subacute. Corolla 5 mm. long (about 8 mm. across when expanded); tube very short, glabrous; lobes of the limb thick, 2.5 mm. long, ovate-oblong, subobtuse, with revolute margins, pubescent on both surfaces, often with a small hairy process (absent in Deccan specimens) on the inner face near the tip; corolline corona of 5 quadrate truncate fleshy lobes at the sinuses; staminal corona minute, annular, close to the staminal column. Anthers without membranous appendages, incumbent on the style-apex; pollen-masses ovoid, large, waxy, pellucid at the apex, attached to the minute pollen-carriers by moderately long caudicles. Follicles subwoody, 6.3-9 cm. long,

turgid, tapering into an obtuse shortly curved beak. Seeds 6 mm. long, narrowly ovate-oblong, acute; coma 3.2-3.8 cm. long.

Distribution: Punjab, W. Peninsula, Ceylon, Burma, Malay Peninsula.—Ava.

The plant is stimulant and tonic.

Bombay: Dodhi, Palakuda, Rayadodi, Shinguti—; *Hindi:* Dori—; *Marathi:* Dodi, Khirkhodi, Raidodi—; *Porebunder:* Kharkhodi Nahanidodi—; *Sanskrit:* Arkapushpi, Jivanti, Shakashreshtha, Svarnajivanti, Tittajivanti—; *Tamil:* Palaikkodi, Palakudai—; *Telugu:* Kalasa; Mukkutummudu, Palatige—.

TYLOPHORA R. Br.

Twining (rarely erect) perennials. Leaves opposite. Inflorescence lateral or axillary, usually consisting of slender simple or branched axes with several flower-clusters or short racemes scattered along them or occasionally the flower-clusters are sessile at the nodes of the stem; flowers small. Calyx 5-partite. Corolla deeply 5-lobed, rotate or rotate-campanulate; lobes slightly overlapping to the right; corona of 5 small fleshy tubercles adnate to or radiate from the filament part of the staminal column and arising from near its base. Staminal column arising from the base of the corolla; anthers erect, small, with a membranous appendage; pollen-masses very minute, erect, suberect or horizontal, attached by their middle or near their base to very slender caudicles by which they are affixed in pairs to the pollen-carriers. Style-apex pentagonal or 5-lobed, depressed, flattened or convex, rarely exceeding the anthers. Follicles smooth, acuminate, sometimes winged. Seeds comose.—Species 50.—Palæotropics.

A. Stem suberect, less than 50 cm. long .... 1. *T. fasciculata.*
B. Stem and branches long, twining
  1. Calyx glabrous .... 3. *T. tenuis.*
  2. Calyx hirsute or pubescent
    Corona-apex free, the point reaching as high as the style-apex .... 2. *T. asthmatica.*

The genus exhibits the therapeutic properties of Ipecacuanha.

The following are used in Annam—*T. ovata* Hook—; in the Philippine Islands and in the islands of Madagascar and La Reunion

—*T. asthmatica* W. and A.—; in Mauritius *T. asthmatica* W. and A., *T. lævigata* Dcne.—; in the Gold Coast—*T. conspicua* N. E. Br.—.

1. **Tylophora fasciculata** Ham. in Wight Contrib. (1834) 50; Wight Ic. t. 848.—PLATE 627.

Stems several from the root, 30-45 cm. long, erect flexuous or slightly twining amongst grass, pubescent. Leaves approximate, diminishing in size upwards, coriaceous, 2.5-5 by 1.3-3.2 cm., ovate or lanceolate, acute, glabrous above, more or less pubescent on the nerves beneath, base acute or rounded; petioles 6-13 mm. long. Flowers in lateral peduncled umbellate or racemose cymes; peduncles arising from between the petioles; pedicels filiform, 1.3 cm. long, pubescent; bracts lanceolate. Calyx divided almost to the base; segments 2 mm. long, lanceolate, acute. Corolla 3 mm. long, deeply divided; lobes 2.5 mm. long, oblong-lanceolate, acute, veined; corona of 5 broadly ovoid fleshy lobes radiating from the staminal column. Anther-appendages membranous, broad, projecting above the 5-lobed style-apex; pollen-masses minute, subtransverse. Follicles 3.8-5 by about 1.3 cm., fusiform, acute, striate, glabrous. Seeds 6 mm. long, broadly ovate, flat; coma 2 cm. long.

Distribution: Upper Gangetic Plain, eastwards to the Khasia Hills, southwards through W. and Central India to Ceylon.

The juice of the root is given with milk as a tonic; the leaves are pounded and used as an application to unhealthy ulcers and wounds to induce healthy granulation.

In the Southern Konkan, it is used as a poison for rats and other vermin.

Bombay: Bhuidari—.

2. **Tylophora asthmatica** Wight and Arn. in Wight Contrib. (1834) 51; Wight Ic. t. 1277.—PLATE 618B.

A twining perennial; roots many, long, fleshy; stems elongate, glabrous or pubescent, not much branched. Leaves 5-10 by 2.5-5.7 cm., ovate or elliptic-oblong, acute or acuminate, often apiculate, glabrous or nearly so above, more or less pubescent (especially when young) beneath, base usually cordate; petioles 6-13 mm. long. Flowers large for the genus, in umbellate cymes; peduncles from

between the petioles, shorter than the leaves, each bearing at its apex 2-3 nearly sessile umbels; pedicels filiform with a number of filiform hairy bracts at their base. Calyx coarsely hairy outside, divided almost to the base; segments 2.5 mm. long, lanceolate, very acute. Corolla greenish yellow or greenish purple, 5-6 mm. long; lobes 4 mm. long, oblong, acute; corona gibbous below, abruptly narrowed at the apex to a free point which reaches nearly as high as the apex of the style. Pollen-masses minute, transverse, attached to the pollen-carriers by distinct caudicles. Style-apex not exserted beyond the anther-tips. Follicles 7.5-10 cm. long, tapering to a fine point at the apex, scarcely tapering towards the base, finely striate, glabrous. Seeds 8 mm. long, broadly ovate; coma 2-2.5 cm. long.

Distribution: Throughout the plains of India, Ceylon.—Siam, Malay Islands, Borneo.

The dried leaves are emetic, diaphoretic and expectorant, useful in over-loaded states of the stomach and other cases requiring the use of emetics. It has also been found useful in dysentery, catarrh, and other affections in which Ipecacuanha has been employed. It may be regarded as one of the best indigenous substitutes for Ipecacuanha.

In the Konkan, 1 to 2 tolas of the juice are given as an emetic; it is also dried and made into pills which are administered in dysentery..

A decoction of the leaves 1 in 10 and an infusion of the root bark were used in dysentery, asthma, and bronchitis and I found them to give satisfactory results in those diseases (Koman).

Bengal: Antomul—; *Bombay:* Anthamul, Kharakirasna, Pitmari—; *Canarese:* Adumuttada, Kirumanjiballi, Nepala, Nepala-daberu—; *Deccan:* Pitkari—; *Hindi:* Antamul, Janglipikvan—; *La Reunion:* Ipéca du pays—; *Malayalam:* Vallippala—; *Marathi:* Pitakari—; *Sinhalese:* Binnuga—; *Tamil:* Kagittam, Kagittiram, Kaludaippalai, Kodagam,, Kondachani, Kuravaram, Kurinja, Nacharuppan, Nacharupaynjan, Nanjaruppan, Nayppalai, Nirkkurinja, Peyppalai, Sarangam, Unmattadi—; *Telugu:* Kakapala, Kukkapala, Mattukumittukoni, Nelatapire, Podapatramu, Tellavedavela, Tellaya-dala, Veripala, Vettipala—; *Tulu:* Nepala—; *Uriya:* Mendi, Mulini—.

3. **Tylophora tenuis** Bl. Bijdr. (1826) 1062.—*T. tenuissima* W. and A. in Wight Contrib. 49; Wight Ic. t. 588.

A slender twiner; stems much-branched, slender, tough, glabrous. Leaves variable, somewhat fleshy, 2-3.8 by 0.8-2 cm. (on the main stem sometimes reaching 5 by 2.5 cm.), ovate or elliptic or oblong, obtuse or acute, often apiculate, glabrous, base acute or rounded; petioles 3-8 mm. long. Flowers lurid-purple inside, in lateral paniculate glabrous cymes; peduncles from between the petioles, close to one of them; pedicels filiform; bracts lanceolate-subulate. Calyx divided nearly to the base, glabrous; segments 1 mm. long, lanceolate, acute. Corolla 4 mm. across; lobes 1.6 mm. long, ovate-oblong, subacute, glabrous, veined; corona of 5 small dark coloured tubercles adnate to the staminal column. Pollen-masses suberect, minute. Style-apex pentagonal, slightly convex. Follicles 5-7.5 cm. long, lanceolate, tapering to both ends, finely pointed, finely striate, glabrous. Seeds 8.5 mm. long, ovate-oblong; coma 2 cm. long.

Distribution: W. Coast and Ghats of Madras Presidency.

The plant is said to be a cure for perspiration, urticaria, and smallpox; an infusion is considered a valuable alexipharmac.

Cosmostigma Wight.

A twining glabrous shrub. Leaves opposite. Flowers small, greenish, in racemose axillary or lateral cymes. Calyx 5-partite. Corolla subrotate, deeply 5-fid; lobes valvate or slightly over-lapping to the right; corona of 5 erect broad membranous truncate or 2-fid scales adnate to the base of the anthers and shorter than them. Staminal column very short; anthers appendiculate with a rounded inflexed membrane; pollen-masses 1 in each anther-cell, erect, attached to the pollen-carriers by long basal caudicles. Style-apex broad, 5-gonous, with a distinct rim and slightly umbonate centre. Follicles large, ovoid-oblong, bluntly pointed, smooth. Seeds comose.—Species 1.—Indo-Malaya.

1. **Cosmostigma racemosum** Wight Contrib. (1834) 42; Wight Ic. t. 591.—Plate 628.

A shruby twiner; stems stout, terete, usually quite glabrous.

Leaves deciduous, 7.5-12.5 by 5-7.5 cm., ovate, acute or acuminate, glabrous, base cordate; petioles 2-3.8 cm. long. Flowers small, greenish, in axillary or sublateral cymes which are at first corymbose, at length racemose; peduncles equalling or exceeding the petioles, arising either from the leaf-axils or just outside them; pedicels 6-13 mm. long; bracts 0. Calyx divided almost to the base, glabrous; segments 2 mm. long, broadly oblong, rounded at the apex and with membranous ciliate margins. Corolla 4 mm. long; lobes 3 mm. long, ovate-oblong, obtuse, fleshy, speckled with brown dots; corona of 5 usually 2-fid broad membranous erect scales. Staminal column arising from near the base of the corolla; pollen-masses clavate, slightly curved, erect, waxy, attached to the pollen-carriers by very long slender flexuous caudicles. Style-apex broad, 5-gonous, with a distinct rim, slightly umbonate in the centre. Follicles 7.5-18 by 3.8 cm., ovoid-oblong, bluntly pointed, smooth. Seeds 1.3 cm. long, ovate, margined; coma 2.5 cm. long.

Distribution: Sylhet, Chittagong, Konkan, N. Kanara, Deccan, Carnatic, Ceylon.—Java.

On the Western Coast, the leaves are used to cure ulcerous sores. The root-bark is administered internally in Vataka, a disease in which lumps of undigested food are passed. Useful in dyspepsia accompanied by a febrile condition and absence of bile in the stools. The authors of the Pharmacographia Indica have tried the root-bark of this plant in such cases, given in five grain doses, three times a day, and have found it to be a most efficient cholagogue; it had no purgative effect, but restored the natural colour of the stools after the usual remedies (mineral acids, podophyllin, euonymin, etc.) had been abandoned in despair.

Canarese: Gharahuvu—; *Goa:* Ghurphul—; *Malayalam:* Vattuvalli—; *Marathi:* Marvel, Marvivel, Shendori, Shendvel—.

Dregea E. Meyer.

Twining shrubs with greenish flowers in umbelliform cymes. Corolla rotate with broad lobes overlapping to right. Corona staminal, with fleshy spreading depressed lobes and a minute inner

cusp incumbent on the anthers. Column very short fleshy, anther-tips short inflexed. Pollinia 1 in each cell, narrow-oblong, erect, waxy, sessile or subsessile. Stigma conical or dome-shaped. Follicles thick hard, often ribbed when dry.—Species 5.—S. Africa to China.

The genus exhibits emetic, expectorant, and maturant properties.

1. **Dregea volubilis** Benth. ex Hook. f. Fl. Brit. Ind. IV (1883) 46.—*Marsdenia volubilis* T. Cooke in Fl. Bomb. II, 166.—Plate 629A.

A large twining shrub; older branches ash-coloured, very long, glabrous, often with lenticels and sometimes with small black dots; young branches green, slender, smooth. Leaves 6.3-15 by 4.5-11.5 cm., broadly ovate or suborbicular, acuminate, glabrous or more or less softly pubescent, reticulately veined and with a few small glands just above the petiole, base rounded or cordate; petioles 1.3-3.2 cm. long. Flowers numerous, green or yellowish green, in lateral drooping umbellate cymes; peduncles arising from between the petioles, 2.5-5 cm. long, slender, puberulous; pedicels 6-25 mm. long, very slender. Calyx divided nearly to the base; segments 2.5 mm. long, ovate-oblong, obtuse or subacute, ciliolate. Corolla 6 mm. long, deeply divided, glabrous outside; lobes 5 mm. long, broadly ovate, obtuse, veined, overlapping to the right; corona-lobes large, fleshy, the upper free portion rounded on the outer edge, obliquely truncate at top, and with a small appiculation on the inner edge, which lies against the top of the anther. Staminal column arising from the base of the corolla; anther-tips membranous, broadly ovate-oblong, obtuse; pollen-masses oblong, attached to the pollen-carriers by very short caudicles. Style-apex dome-shaped. Follicles 7.5-10 cm. long, slightly tapering to a very blunt point, rugosely striate, glabrous. Seeds broadly ovate, 13 by 8 mm., flattened, strongly margined, pale yellowish brown; coma 4.5 cm. long, copious.

Distribution: Bengal, Assam, Deccan, S. M. Country, all plains districts of Madras Presidency, Ceylon.—Java.

1. *The Sweet variety:* The plant is tonic, cooling, aphrodisiac; cures " vata ", biliousness, burning sensation; useful in diseases of the eye.—2. *The bitter variety* : alexiteric, antipyretic, astringent to the

bowels, aphrodisiac; good for dyspepsia, inflammations, rat-bite; cures tumours, piles, leucoderma, asthma, urinary discharges (Ayurveda).

The leaves are much employed as an application to boils and abscesses. The roots and tender stalks are considered emetic and expectorant.

The plant is used in colds and eyes diseases to cause sneezing. This property of the plant is also known in Madras, where the young shoots are cut and the exuding juice is inserted into the nose.

Badaga: Karegije—; *Bengal:* Titakunga—; *Bombay:* Dodhi—; *Burma:* Gwaytankpin—; *Canarese:* Dugdhike—; *Gujerati:* Dodi, Kharkhodi—; *Hindi:* Nakchhikni—; *Malayalam:* Vattakkakkakkoti—; *Marathi:* Ambri, Harandodi, Harandori, Haranvela, Hirandodi, Hirandori, Hori, Khandodi—; *Mundari:* Birkonggadnari, Marangkonggad—; *Porebunder:* Dodi, Malati, Mhotidodi—; *Sanskrit:* Hemajivanti, Hemakshiri, Hemalata, Hemapurna, Hemavalli, Hemavati, Hemavha, Himashraya, Madhumalati, Saumya, Sujivanti, Sumangala, Suparnika, Svarnajiva, Svarnajivantika, Svarnalata, Svarnaparna, Trinagranthi—; *Santal:* Marangkongat—; *Sinhalese:* Kirianguna—; *Tamil:* Kamal, Kodippalai, Kudasappalai, Kurinja, Kurinjakkirai, Palaikkodi, Singittam, Sivandi, Vanadittam—; *Telugu:* Dudipala, Palakura, Palatige—; *Uriya:* Dughdika, Madhumalati—.

Ceropegia Linn.

Perennial herbs erect or twining; rootstock often tuberous. Leaves opposite, sometimes minute or 0. Flowers often large, in lateral (rarely terminal) umbellate or racemose cymes, rarely solitary or in pairs. Calyx 5-partite. Corolla tubular, usually elongate, more or less inflated at the base, straight or curved; lobes 5, more or less connate at their tips, valvate in bud; corona staminal, double, arising from the staminal column, the outer corona cup-shaped, entire or 5-10-toothed, or of 5-bifid lobes more or less adnate to the inner corona-lobes and often appearing to form one series with them, or reduced to minute pouches alternating with the stamens, the inner corona of 5 short or long lobes opposite the anthers and incumbent on them or erect, dorsally adnate to their base to the cup

of the outer corona or laterally to its lobes, when the corona appears to be formed of 5 lobes with a tooth on each side at the base. Staminal column arising a little above the base of the corolla, very short, included in its inflated basal part; anthers oblong or subquadrate without appendages; pollen-masses erect, ascending or subhorizontal, 1 in each anther-cell, attached to the pollen-carriers by short caudicles or subsessile. Style-apex not exserted, truncate or shortly conical. Follicles lanceolate or linear-fusiform, acuminate, smooth. Seeds comose.—Species 120.—Africa, Asia, Australia.

1. Leaves fleshy, exceeding 2.5 cm. long .... 1. *C. bulbosa.*
2. Leaves membranous, peduncles glabrous, Corolla-lobes contracted into a narrow beak in bud .... 2. *C. tuberosa.*

The tuber is tonic and digestive.

1. **Ceropegia bulbosa** Roxb. Corom. Pl. I (1795) 11, t. 7.—Plate 630.

Twining; root tuberous, the size of a small turnip, a little flattened, with several fibres from its base; stem very slender, usually glabrous. Leaves excessively variable. Flowers in pedunculate umbellate cymes; peduncles 1.3-2.5 cm. long, arising from between the petioles; pedicels 3-6 mm. long, slender. Calyx divided to the base; sepals 2 mm. long, lanceolate, acute. Corolla 1.3-2 cm. long, greenish; tube inflated at the base; lobes 4 mm. long, linear from a deltoid base, hairy, connate at the tips, violet-purple inside; outer corona-lobes 5, minute; inner corona-lobes narrowly linear, 2 mm. long. Pollen-masses erect, attached to the pollen-carriers by very short caudicles. Follicles 10 cm. by 4 mm., cylindric, tapering towards an acute apex, glabrous; pericarp thin. Seeds 8 mm. long, ovate-oblong, flattened, with a broad submembranous margin; coma 2.5-3.2 cm. long.

Distribution: Punjab, Upper Gangetic Plain, Konkan, S. Kanara, Malabar, Deccan, Carnatic.

The tubers are tonic and digestive.

The drug is used in Behar in colds and eye-diseases to cause sneezing; dose: gr. 1 to ½ dram.

Bombay: Patalatumbari—; *Canarese:* Hallike—; *Hindi:* Khapparkadu—; *Marathi:* Gayala, Khapparkadu—; *Punjab:*

Galot—; *Telugu:* Mande, Manjimande, Nimmatayi, Palatige, Tiyyamande—.

2. **Ceropegia tuberosa** Roxb. Corom. Pl. I (1795) 12, t. 9; Wight Ic. t. 353.—PLATE 631.

Twining, glabrous; root of many small tuberous knobs with fleshy fibres; stem slender. Leaves membranous, 3.2-10 by 1.3-5 cm., the lower leaves suborbicular, the middle stem leaves ovate, the upper oblong, all usually apiculate, glabrous, base rounded, acute or subcordate; petioles 6-13 mm. long. Peduncles 1-3 together, 1.3-7.5 cm. long, arising from between the petioles or subaxillary; pedicels fascicled or subpaniculate, slender, glabrous; bracts subulate. Calyx divided to the base; sepals 4-5 mm. long, narrowly lanceolate, acute, with scarious margins, more or less recurved. Corolla 2.5-3.8 cm. long; tube inflated at the base and enlarged at the mouth; limb suddenly contracted from a broad triangular base into linear lobes, at first connate throughout their entire length, appearing in bud like a narrow beak, afterwards free, about ½ as long as the tube; outer corona cupular, truncate, with 5 small pockets alternating with the inner corona-lobes, ciliate; inner corona-lobes 2.5 mm. long, linear, slightly clavate at the apex. Pollen-masses with a pellucid apical margin, erect, attached to the pollen-carriers by very short caudicles. Follicles 9-12.5 cm. by 3 mm., slender, straight or very slightly curved, tapering to a fine point, glabrous. Seeds 6 mm. long, linear-oblong, strongly margined; coma 2.5-3.8 cm. long.

Distribution: Konkan, Deccan, S. M. Country, N. Circars.

The plant is bitter; cures diarrhœas and dysenteries, inflammation of the gums, delirious fevers of parturition (Ayurveda).

The starchy, somewhat bitter tubers, are used as a nutritive tonic in the bowel complaints of children.

Bombay: Khapparkadu—; *Canarese:* Bittarige—; *Hindi:* Patalatumbi—; *Marathi:* Paralatumbdi—; *Sanskrit:* Bhutumbi, Devi, Divyatumbi, Gartalabu, Nagatumbi, Shakrachapasamudbhava, Valmikasambhava—; *Telugu:* Bachalimanda, Pullamanda—.

CARALLUMA R. Br.

Succulent perennial branched almost leafless herbs; stems usually angled, thick and fleshy. Flowers in few- or many- flowered fascicles or sessile umbels, at the base, apex, or along the sides of the stems between the angles, pedicellate or subsessile. Calyx 5-partite. Corolla rotate or broadly campanulate; lobes 5, valvate in bud; corona double, arising from the staminal column, the outer corona annular or cupular, adnate to the backs of the inner corona-lobes at their base or connected to them by narrow partitions, 5-lobed, the lobes 2-cuspidate, the inner corona-lobes incumbent on the backs of the anthers and not exceeding them, or produced into erect connivent or recurved tips. Staminal column short, arising from the bottom of the corolla; anthers without appendages; pollen-masses horizontal or ascending, 1 in each anther-cell, pellucid along the inner margin or at the apex, attached to the pollen-carriers in pairs by short rather slender caudicles. Style-apex truncate, not exserted beyond the anthers. Follicles narrowly fusiform, linear-terete or 3-gonous, smooth. Seeds comose.

The genus is therapeutically inert.

1. **Caralluma edulis** Benth. Gen. Pl. II (1876) 782.—*Boucerosia edulis* Edgw. Journ. Linn. Soc. VI (1862) 205, t. 1.

Erect, 15-45 cm. high; stem and branches subterete, 4-grooved. Leaves sometimes present on the young shoots, 6-13 mm. long, linear, acute. Flowers 1-4 together from the apex or the nodes of the stem, subaxillary when leaves are present; pedicels 3-13 mm. long. Calyx divided to the base, glabrous; sepals 2.5 mm. long, ovate, acute, with membranous margins. Corolla campanulate, purple inside, 6 mm. long, glabrous within; lobes 4 mm. long, ovate-lanceolate, acute; outer corona 5-lobed, each lobe produced into 2 distant subulate teeth; lobes of the inner corona 1 mm. long, linear, subacute. Pollen-masses subhorizontal, 1 in each anther-cell, attached to the pollen-carriers by short slender caudicles. Style-apex truncate, not exserted. Follicles not seen.

Distribution: Punjab, Baluchistan, Sind.

The plant is bitter, sweet; cooling, alterative, anthelmintic; useful in leprosy and diseases of the blood; causes constipation (Ayurveda).

Punjab: Chung, Chungapippa, Pipa, Pippu, Sittu, Situn, Suhigandhal—; *Sanskrit:* Dugdha, Dugdhapashana, Dugdhika, Kshirakshava, Kshiri, Kshirini, Uttamphalini, Yugmaphalottama—.

Boucerosia Wight & Arn.

Fleshy leafless herbs, with thick 4-angled stems, angles toothed. Flowers terminal, rather large, solitary or umbelled, more or less purple. Sepals narrow. Corolla campanulate or rotate; lobes 5, short, broad, valvate. Corona annular, adnate to the column, 5-lobed; lobes 2-fid, subulate, erect or spreading with a linear fleshy process on the inner face at the sinus inflexed over the anther. Column minute, short; anther-tips inappendiculate; pollen-masses one in each cell, sessile, erect, suborbicular, compressed. Stigma low, conical, 5-angled, tip truncate depressed. Follicles slender, straight, terete, smooth. Seeds flat, winged, comose.—Species 30.—Tropical Africa and Asia.

The genus has little therapeutical value.

1. **Boucerosia aucheriana** Dcne. in DC. Prodr. VIII, 649. —Plate 629B.

Fleshy leafless herbs, stem 5-15 cm. high, short-branched; branches 8-12 mm. diam. Flowers capitate. Sepals ovate-lanceolate. Corolla 8 mm. diam., dark purple, deeply divided into narrow lobes; corolla-lobes lanceolate, glabrous, pustular above. Follicles 7-10 cm. long, tips capitate.

Distribution: Dry hills in the W. Punjab, Waziristan, Baluchistan,—Afghanistan, Persia, Arabia.

The juicy stems are considered stomachic, carminative, and tonic. They are also used as vermifuge, and dried and powdered, they are taken as stimulants. It is also used as a febrifuge.

At Kila Saifulla, the plant is a cure for rheumatism and used as a vegetable (Hughes-Buller).

Babihan: Pamni, Peman—; *Barkhan:* Pamangi, Pipi—; *Bolan:* Marmut—; *Bori Hills:* Pamangi, Pipi—; *Duki:* Pamangi, Pipi—; *Fort Sandeman:* Pamangi—; *Kila Saifulla:* Pamanghi—; *Kohlu:* Pannangi—; *Kulanch:* Aputag—; *Las Bela:* Boteri—; *Loralai:* Pamanghi—; *Musa Khel:* Pamangi, Pipi—; *Punjab:* Charungli, Chungi, Pamanke, Pawanne—; *Shahrig:* Pamni, Peman—.

LOGANIACEAE.

Trees, shrubs, or herbs. Leaves opposite (rarely ternate), entire; stipules present or reduced to a transverse line. Flowers usually regular, hermaphrodite, generally in 2-3-chotomous cymes, various in size and colour. Calyx inferior; tube short; lobes usually 4-5. Corolla gamopetalous, 4-5- lobed or -partite; lobes imbricate or valvate. Stamens 4-5 inserted on the corolla-tube, alternate with its lobes; anthers 2-celled. Ovary free, usually 2-celled; ovules 1-many in each cell; styles 1 or 2. Fruit capsular or indehiscent, 1-many-seeded. Seeds various, albuminous; embryo usually straight; cotyledons broad or narrow; radicle usually inferior.—Genera 35. Species 550.—Tropical, a few warm temperate.

Ovules many in a cell. Fruit baccate
1. Shrubs. epiphytic, or trees. Flowers large, fleshy. Leaves thick, fleshy .... FAGRAEA.
2. Woody climbers; very bitter, with tendrils .... STRYCHNOS.
3. Trees. Leaves thinly coriaceous. Flowers membranous ...... CYRTOPHYLLUM.

The Order exhibits bitter, febrifuge, and tetanic properties.

It is very rich in alkaloids—bakankosine, brucine, curarine, curine, gelsemidine, gelsemine, gelseminine, gelsemoidine, koumine, kouminicine, kouminidine, kouminine, protucurarine, protocuridine, protocurine, sempervine, sempervirine, spigeline, struxine, strychnicine, strychnine, tubocurarine—.

The presence of a glucoside, aesculin, has been recorded.

OFFICIAL:—Strychnine (France, Great Britain, Portugal, Spain);—hydrochloride (Great Britain);—nitrate (Austria, Belgium,

Denmark, Germany, Holland, Hungary, Italy, Japan, Russia, Spain, Sweden, Switzerland, Turkey, United States);—sulphate (France, Spain, United States).

Gelsemium sempervirens Aiton (Switzerland).

Spigelia marilandica Linn. (Portugal).

Strychnos spp. (Great Britain); *S. Ignatii* Berg. (France, Spain), —Bergius and Lamk.=*Ignatiana philippinica* Lour. (Portugal); *S. nux-vomica* Linn. (Austria, Belgium, Denmark, France, Germany, Great Britain, Holland, Hungary, Italy, Japan, Norway, Russia, Spain, Sweden, Switzerland, Turkey, United States)=*S. colubrina* Wight (Portugal).

FAGRAEA Thunb.

Trees or shrubs, often epiphytic, sometimes scandent. Leaves opposite, entire (crenulate in F. crenulata); petioles dilated at base or united by a stipulary sheath. Cymes collected in corymbs racemes or elongate panicles, terminal or axillary; bracts small. Flowers large or small, white, yellowish or rarely pink. Calyx deeply 5-fid; lobes thick, broad, much imbricate. Corolla-tube long, narrow or funnel-shaped; lobes 5, broad, twisted to the left in the bud. Stamens 5, filaments filiform; anthers oblong. Ovary 2-celled, or 1-celled above, style filiform, stigma capitate; ovules very many in each cell. Berry 1-2-celled. Seeds very many, immersed in pulp, testa crustaceous, albumen horny; embryo small, straight.—Species 20.—E. India to Australia.

The genus exhibits antipyretic properties.

1. **Fagraea racemosa** Jack, Roxb. Fl. Ind. II (1832) 35.

A large bush with stout pale stems, or tree 3.6-9 m. tall. Leaves coriaceous, elliptic shortly abruptly blunt-acuminate, base shortly narrowed or oblanceolate; nerves prominent, 5-7 pairs midrib stout; 15-25 cm. long, 5.7-10 cm. wide. Peduncles 5-7.5 cm. long. Flowers in dense racemes of very shortly peduncled or sessile cymes of 3, numerous; whole raceme 3.8 cm. long, sometimes lengthening to 7.5 cm. Calyx obovoid, lobes rounded at tip, 6 mm. long. Corolla flesh-colour, tube 2 cm. long, base narrow cylindric, above broad

funnel-shaped, lobes rounded, 13 mm. long, 5 mm. wide. Stamens included. Fruit 13 mm. long, globose.

Distribution: Malay Peninsula.

The root-bark is used as a cure for fever.
Burmese: Thithpaloo—; *Malay:* K'lu payam, Mumpulih—.

STRYCHNOS Linn.

Trees or scandent shrubs with short axillary often hooked tendrils. Leaves opposite, usually coriaceous, 3-5-nerved at or a little above the base. Flowers usually white, in terminal or axillary cymes; bracts small. Calyx 5- or 4- partite. Corolla campanulate or hypocrateriform; lobes 5 or 4, valvate. Stamens 5 or 4, inserted in the throat of the corolla; filaments short, filiform; anthers ovate, with distinct parellel cells. Ovary 2-celled throughout, or 1-celled in the upper part; ovules many in each cell; style long or short; stigma capitate or obscurely 2-lobed. Berry usually globose, with a hard rind. Seeds many or 2-1, embedded in a fleshy pulp, variously compressed or, if solitary, globose; albumen horny; embryo short; cotyledons foliaceous; radicle terete, short.—Species 200.—Tropics.

A. Erect trees. Anthers and ovary glabrous
  a. Leaves elliptic, shining, 7.5-15 cm. .... 2. *S. nux-vomica.*
  b. Leaves ovate or elliptic, coriaceous, 5-7.5 cm. .... 3. *S. potatorum.*
B. Scandent shrubs with tendrils which often are stout and woody
  a. Corolla-tube very short, shorter than the calyx
    1. Leaves elliptic-lanceolate, 5-10 cm. .... 1. *S. colubrina.*
    2. Leaves (young) elongate-elliptic, 5 cm. long ...... 4. *S. bourdilloni.*
  b. Corolla-tube cylindric, 5-10 times the length of calyx .... 5. *S. cinnamomifolia.*

This genus exhibits diverse medicinal properties. It is poisonous, the toxic principles acting principally on the spinal cord.

The following species are used medicinally in China and Cambodia—*S. nux-vomica* Linn.—; in Tongking—*S. gaultheriana* Pierre—; in the Malay Archipelago—*S. ligustrina* Blum.—; in the Philippine Islands—*S. ignatii* Berg.—; In Java—*S. tieute* Lesch.—; in Guiana—*S. toxifera* Benth.—; in Brazil—*S. pseudoquina* St. Hil., *S. toxifera* Schomb.—; in Madagascar—*S. spinosa* Lam.—; in South

Africa—*S. dysophylla* Benth., *S. henningsii* Gilg., *S. pungens* Solered., *S. spinosa* Lam.—; in Congo—*S. albersii* Gilg. & Busse, *S. cardiophylla* Gilg. & Busse, *S. elliotii* Gilg. & Busse, *S. melonicarpa* Gilg. & Busse, *S. procera* Gilg. & Busse, *S. stuhlmannii* Gilg., *S. unguacha* *A. Rich.* var. *obovata* De Wild.—; in Guinea—*S. innocua* Del.—.

OFFICIAL:—Strychnine (France, Great Britain, Portugal, Spain);—hydrochloride (Great Britain);—nitrate (Belgium, Denmark, Germany, Holland, Hungary, Italy, Japan, Russia, Spain, Sweden, Switzerland, Turkey, United States);—sulphate (France, Spain, United States).

The seeds of *Strychnos spp.* (Great Britain); *S. Ignatii* Berg. (France, Spain),—Bergius & Lamk.=*Ignatiana philippinica* Lour. (Portugal); *S. nux-vomica* Linn. (Austria, Belgium, Denmark, France, Germany, Great Britain, Holland, Hungary, Italy, Japan, Norway, Russia, Spain, Sweden, Switzerland, Turkey, United States) =*S. colubrina* Wight (Portugal).

1. **Strychnos colubrina** Linn. Sp. Pl. (1753) 189.—PLATE 632.

A large woody climber; stem often 7.5 cm. diam. at the base; bark smooth. Tendrils usually single but sometimes in pairs, circinate, thickened upwards. Leaves 7.5-11.5 by 3.2-5 cm., elliptic or elliptic-lanceolate, acute, glabrous, shining, strongly 3-nerved from the usually narrowed base; petioles 6-10 mm. long. Flowers in small compound axillary puberulous cymes; peduncles very short; pedicels 0-2.5 mm. long. Calyx 2 mm. long, puberulous; segments 5, orbicular-oblong, 1 mm. long, with membranous ciliolate margins. Corolla 3 mm. long, 5-lobed; lobes 2.5 mm. long, oblong, subacute, with a dense fringe of hairs about ½-way down inside. Ovary glabrous below, hairy in the upper part. Berry 1.7 cm. diam., crustaceous, 1-2-seeded. Seeds 1.3 cm. diam., discoid.

Distribution: W. Peninsula, S. India.

The wood of the root is esteemed by the Telinga physicians as an infallible remedy for the bite of the *Naga,* as well as for that of every other venomous snake. It is applied externally, and at the

same time given internally. It is also given in substance for the cure or intermittent fevers, in cutaneous affections, and to alleviate the pain and swelling from confluent small-pox.

In the Konkan, the fresh leaves, rubbed into a paste with the kernel of the cashew nut, are applied to suppurating tumous.

The bruised fruit is applied to the head in mania, the root rubbed down with pepper is given to check diarrhœa, and boiled with oil it is used as a liniment for pains in the joints.

The root is used in Java as a febrifuge and anthelmintic and also externally in certain skin diseases.

The wood of the root is not an antidote to snake-venom (Mhaskar and Caius).

Bengal: Kuchilalata—; *Bombay:* Goagarilakei—; *French:* Arbre aux serpents, Bois de couleuvre, Rasine de couleuvre—; *Hindi:* Kuchilalata—; *Konkani:* Pandri—; *Malayalam:* Cherukattuvallikkaniram, Modirakaniram, Motirakkanniram—; *Marathi:* Kajarvel, Kanel—; *Portuguese:* Pao de cobra—; *Telugu:* Kavusukandira, Nagamushti, Tigemushti—.

2. **Strychnos nux-vomica** Linn. Sp. Pl. (1753) 189.—PLATE 633A.

A deciduous tree sometimes reaching 30 m. in height, often with short sharp strong axillary spines; bark thin, grey, smooth or rough with lenticles. Leaves 7.5-15 by 4.5-7.5 cm., broadly elliptic, acute, obtuse, or shortly acuminate, glabrous and shining, 5-nerved (the lateral pair often faint), base usually rounded; petioles 6-13 mm. long. Flowers numerous, greenish white, in terminal pedunculate pubescent compound cymes; peduncles and pedicels short, pubescent. Calyx 2.5 mm. long, pubescent outside; segments 5, lanceolate, acute, 1.5 mm. long. Corolla a little less than 1.3 cm. long, 5-lobed, glabrous or nearly so outside; tube cylindric, hairy inside below, the throat glabrous; lobes 4 mm. long, narrowly oblong, acute. Ovary and style glabrous. Fruit globose, 2.5-7.5 cm. diam., slightly rough but shining, orange-red when ripe. Seeds usually many, discoid, about 2 cm. diam., much compressed, concave on one side and convex

on the other, clothed on both sides with very fine appressed grey silky hairs radiating from the centre; cotyledons cordate.

Distribution: Konkan, N. Kanara, S. M. Country, N. Circars, Deccan, Carnatic, W. Coast of Madras Presidency in deciduous forests and up to 4,000 ft. in hilly country, Travancore, Ceylon.—Indo-China. Laos.

The fruit is bitter, acrid, pungent; heating, appetiser, tonic, astringent to bowels, antipyretic; cures leucoderma, "vata" and "kapha", diseases of the blood, itching, piles, ulcers, anæmia, jaundice, urinary discharges (Ayurveda).

The fruit is bitter and poisonous; heating, tonic, aphrodisiac, diuretic, emmenagogue; cures pain in the joints, lumbago, ringworm, piles; useful in paralysis and weakness of the limbs (Yunani).

The leaves when applied as poultice, promote healthy action in sloughing wounds or ulcers, more especially in those cases when maggots have formed. It arrests any further formation of them, and those in the deeper parts perish immediately when the poultice is applied. The root-bark is ground up into a fine paste with lime-juice, and made into pills which are said to be effectual in cholera.

In the Konkan, small doses of the seeds are given with aromatics in colic, and juice of the fresh wood (obtained by applying heat to the middle of a straight stick to both ends of which a small pot has been tied) is given in doses of a few drops in cholera and acute dysentery. In some districts small quantities of the seeds are taken, apparently as a stimulant, or in lieu of opium.

In the Indian Archipelago, the wood is used as a popular remedy for dysentery, fevers, and dyspepsia.

In Ceylon, the roots are ground with water and applied to the bite of the snake (Roberts).

The root is not an antidote to snake-venom, and is useless as an external application in the treatment of snake-bite (Mhaskar and Caius).

In Cambodia, the seed is used as an emetic. Internally an infusion of the bark is given in epilepsy; externally the bark is used in the treatment of ulcers, atonic and leprotic.

Arabic: Khanekulkella, Izaragi, Leuzalke—; *Bengal:* Kuchila, Thalkesur—; *Bombay:* Jharakatchura, Kajra, Kara—; *Burma:*

Kabaung—; *Cambodia:* Sleng thom—; *Canarese:* Hemmushti, Ittangi, Itti, Kajavara, Kanjira, Kasara, Kasaraka, Kasarka, Mushti, Nanjinakoradu—; *Catalan:* Mataca—; *Central Provinces:* Kuchla—; *Chinese:* Fan Mu Pieh, Ma Ts'ien Tse—; *Danish:* Braeknoed, Broaerknoedd, Raevekage—; *Dutch:* Braaknooten, Strychnoszaad—; *English:* Crow Fig, Kachita, Nux-vomica Tree, Poison Nut, Strychnine Tree—; *French:* Noix vomique, Vomiquier—; *German:* Brechnuss, Kraehenaugen—; *Gujarat:* Kuchla—; *Hindi:* Bailewa, Chibbinge, Kajra, Kuchla, Nirmal—; *Hungarian:* Elveszmag, Varjuszem—; *Italian:* Noce vomica—; *Konkani:* Kazro—; *Koya:* Mushti—; *Malayalam:* Kannirakkuru, Kanniram, Kariram, Tettamperahmaram—; *Marathi:* Jharkhatchura, Kajra, Kar, Kara—; *Nepal:* Nirmali—; *Norwegian:* Raevekake—; *Orissa:* Kachila—; *Oudh:* Kuchla—; *Persian:* Fuluzmahi, Izaraki—; *Portuguese:* Noz vomica—; *Punjab:* Kagphala, Kajra, Kuchila, Hubuljarab—; *Reddi:* Musidi—; *Russian:* Chelibukha—; *Sanskrit:* Chipita, Dirghapatra, Garadruma, Kachchira, Kakanda, Kakapilu, Kakasphurja, Kakatinduka, Kalakutaka, Karaskara, Kimpaka, Krishnabana, Kulaka, Kupaka, Kupilu, Markatatindu, Markatatinduka, Payahprasadi, Ramyaphala, Vartula, Vishadruma, Vishamushti, Vishatinduka—; *Sinhalese:* Godakadura, Godakaduraatta, Kanchura—; *Spanish:* Higuillo de la India, Matacan, Mataperros, Nuez vomica—; *Swedish:* Raevkaka, Rafkaka—; *Tamil:* Etti, Kagodi, Kalam, Kanjiga, Kanjirai, Kanjiram, Karalam, Keshamamutti, Kiruttinabanam, Kobagundam, Kodaram, Kondagulam, Kubashuba, Maduragam, Mavagam, Mutti, Nachu, Sitti, Suvasagam, Vishamutti—; *Telugu:* Mushti, Musidi—; *Tulu:* Kayeru—; *Turkish:* Cevzi mukayyi—; *Urdu:* Azaraki, Kuchala—; *Uriya:* Kora, Kosila—.

3. **Strychnos potatorum** Linn. f. Suppl. (1781) 148.—PLATE 633B.

A moderate sized glabrous tree attaining 12 m.; bark black, cracked and scaly; trunk often irregularly fluted. Leaves 5-7.5 by 2.5-4.5 cm., nearly sessile, subcoriaceous, ovate or elliptic, acute or subacuminate, glabrous and shining, spuriously 3- or 5- nerved (the lateral nerves springing from the lower part of the midrib not far from its base), base rounded or acute; petioles 2.5 mm.

long. Flowers rather large for the genus, in short almost glabrous nearly sessile axillary cymes; peduncles 0.5 mm. long; pedicels very short. Calyx 2 mm. long, glabrous; segments 5, ovate, acute, 1.25 mm. long. Corolla 4-6 mm. long, 5-lobed; lobes 2.5 mm. long, oblong, acute, with a tuft of hair inside towards the base of each lobe. Ovary ovoid, glabrous, tapering into a long glabrous style; stigma obscurely 2-lobed. Berry black when ripe, 1.7 cm. diam. Seeds 1 or 2, circular, 8 mm. diam., bluntly lenticular, not greatly compressed (in shape like a cheddar cheese), shining with short appressed silky hairs, yellow.

Distribution: Konkan, N. Kanara, Central India, N. Circars, Deccan, Carnatic to S. Travancore, Ceylon, Burma.

The plant is acrid, bitter; alexiteric, anthelmintic; increases appetite and improves taste; good in troubles of the eyes, thirst, burning sensation, tumours, pains, urinary discharges.—The root cures all kinds of leucoderma.—The unripe fruit is useful in diseases of the eye, thirst, poisoning, hallucinations; increases "vata".—The ripe fruit is emetic, diaphoretic, alexiteric; cures inflammations, anæmia, jaundice; causes biliousness.—The seeds are acrid; alexipharmic, lithontriptic; good in diseases of the eye; cure strangury, urinary discharges, diseases of the head (Ayurveda).

The seeds have a bitter bad taste; astringent to the bowels, aphrodisiac, tonic, diuretic; good for the liver, in kidney complaints, in gonorrhœa; improve the eyesight; relieve colic; a good remedy for snake-bite (Yunani).

The use of the seeds, for the purpose of clearing muddy water, is as old as Susruta, who mentions it in his chapter on water. Medicinally, they are chiefly used as a local application in eye diseases. The seeds are rubbed with honey and a little camphor, and the mixture applied to the eyes in lachrymation or copious watering from them. Rubbed with water and rock salt, they are applied to chemosis in the conjunctiva.

In long-standing and chronic diarrhœa which resists all treatment, one-half or a full seed, rubbed up into a fine paste with some butter milk and given internally for one week, is said to be effectual.

In Madras, the seeds are used in diabetes and gonorrhœa.

The ripe fruit and the seeds are used as antidotes to snake-poison, which they are not (Mhaskar and Caius).

Bengal: Nirmali—; *Bombay:* Gajrah, Nirmali—; *Burma:* Kamonyeki, Khaboungyackyie—; *Canarese:* Andugu, Chalibija, Chilla, Chittubija, Kataka—; *Central Provinces:* Kuwi—; *Deccan:* Chilbinj—; *English:* Clearing Nut Tree—; *Gond:* Ustumri—; *Hindi:* Neimal, Nelmal, Nirmali—; *Lambadi:* Nulmeiro—; *Malaya:* Tettamparel, Titramparala—; *Malayalam:* Katakam, Tetta, Tettamparal, Tettamparalkaniram—; *Marathi:* Chilbing, Chilhara, Gajara, Nirwali—; *Punjab:* Nirmali—; *Reddi:* Induva, Silla—; *Sanskrit:* Ambuprasadanaphala, Ambuprasadani, Chakshushya, Chhedaniya, Guchhaphala, Kata, Kataka, Katakarenu, Kattha, Khataka, Lekhanatmaka, Payaprasadi, Ruchishya, Ruchya, Rushya, Shlakshna, Shodanatmaka, Tiktamaricha, Tiktaphala, Toyaprasadana—; *Santal:* Kuchla—; *Sinhalese:* Ingini—; *Tagalog:* Camotin—; *Tamil:* Akkolam, Ilalam, Kadali, Sillam, Tetta, Tettankottai, Teru—; *Telugu:* Andugu, Indugu, Indupu, Katakamu, Shilla—; *Urdu:* Nirmali—; *Uriya:* Kotoko, Nirmola—.

4. **Strychnos bourdilloni** Brandis Ind. Trees (1911) 474.

A gigantic climber. Young leaves elongate-elliptic, blade 5 cm., petioles 8 mm., tendrils simple, thick, woody. Flowers in terminal compact trichotomous pubescent cymes at the ends of branchlets, pedicels very short, calyx-segments pubescent, obtuse, corolla glabrous, tube almost 0, lobes thickened and cucullate at apex. Anthers glabrous, oblong apiculate, cells slightly diverging at base, filaments very short, ovary glabrous.

Distribution: S. Kanara, Travancore.

A decoction of the root is applied in rheumatism, ulcers, elephantiasis, fever, and epilepsy.

5. **Strychnos cinnamomifolia** Thw. Enum. (1860) 201.—*S. colubrina* Wall. Wight Ic. t. 434 (non Linn).

A very large woody climber, stems attaining 7.5-10 cm. diam., bark smooth, yellowish grey, branches divaricate, twigs dilated at nodes, tendrils large, solitary, axillary and terminal, circinate, much thickened. Leaves 7.5-10 cm., oval or lanceolate-oval, tapering or

rounded at base, acuminate, acute, strongly 3-nerved, petiole 6-10 mm. Flowers large (for genus), on pubescent pedicels, cymes terminating branchlets, pedunculate, shorter than leaves. Calyx pubescent, segments ovate, acute. Corolla pubescent outside, tube nearly 13 mm., lobes 5, less than half as long as tube, lanceolate, acute. Berry 3.8-7.5 cm. diam., pericarp thin, seeds several, immersed in pulp, similar to those of *S. Nux-vomica* in all respects, but rather less compressed.

Distribution: Ceylon.

A decoction of the root is applied in rheumatism, ulcers, elephantiasis, fever, and epilepsy.

Sinhalese: Etakirindiwel, Welbeli—.

CYRTOPHYLLUM Reinwdt.

Big or medium trees. Leaves thin, subcoriaceous, small lanceolate. Flowers white or pale yellow medium size in corymbs axillary and terminal. Corolla thin, membranous, salver-shaped. Stamens long exsert, from top of the tube. Style exsert. Berry small, bilocular, many-seeded.—Species 4 or 5.—Malayan.

The genus exhibits antiperiodic properties.

1. **Cyrtophyllum peregrinum** Bl. Bijdr. 1022.—*Fagraea fragrans* Roxb. Fl. Ind. II, 32.

Tree about 18 m. tall, 30-60 cm. through, bark rough, irregularly grooved. Leaves elliptic acuminate, base narrow, edges straight; nerves 8 pairs; 5.7-10 cm. long, 3.5 cm. wide; petioles 7.5-15 mm. long. Cymes corymbose, pendent, 20- to 30- flowered. Calyx-lobes short ovate. Corolla-tube 6 mm. long, funnel-shaped, creamy white, lobes oblong, reflexed, blunt as long. Stamens long, exsert. Berry 5 mm. through, globose, scarlet. Seed very small, quadrate.

Distribution: Cambodia, Borneo, Malay Peninsula.

The Burmese use the bark as a remedy for malarious fever.

Burma: Anan—; *Malay:* Tembusu—; *Paragua:* Urung—.

GENTIANACEAE.

Annual or perennial bitter usually glabrous herbs (rarely shrubs). Leaves opposite (alternate in LIMNANTHEMUM); stipules 0. Flowers usually regular and hermaphrodite, in terminal cymes or clusters, or axillary and clustered or solitary. Calyx inferior, 4-5- lobed or -partite; lobes usually imbricate. Corolla gamopetalous; tube campanulate, infundibuliform or cylindric; lobes usually 4-5, contorted, imbricate or induplicate-valvate. Stamens as many as the corolla-lobes, inserted in the corolla-tube or at its mouth; filaments filiform or dilated at the base; anthers dehiscing longitudinally, less commonly by apical pores or short slits. Disk annular, or of 5 glands at the base of the ovary or 0. Ovary superior, 2-carpellary, 1-2-celled; ovules usually many in each cell; style simple; stigma entire or 2-lobed. Fruit usually capsular and indehiscent, septicidally 2-valved. Seeds usually sessile, sometimes winged; albumen copious; testa membranous or crustaceous; embryo small.—Genera 80. Species 800.—Cosmopolitan.

A. Leaves opposite. Corolla-lobes twisted to the right. Ovary completely 2-celled. Style filiform
 Corolla blue, purplish or white .... EXACUM.
B. Leaves opposite. Corolla-lobes twisted to the right. Ovary 1-celled. Style filiform
 1. Flowers regular, in axillary clusters .... ENICOSTEMMA.
 2. Flowers regular, panicled or terminal, subcapitate .... ERYTHRAEA.
 3. Flower irregular. Stigma scarcely divided. Minute herbs .. HOPPEA.
 4. Flower irregular. Stigmas 2 .... CANSCORA.
C. Leaves opposite, rarely alternate. Corolla-lobes twisted or imbricate. Ovary 1-celled. Style short, rarely elongate
 1. Corolla tubular campanulate. Stamens attached on the tube .... GENTIANA.
 2. Depressions or pits of the corolla shallow .... SWERTIA.
D. Aquatic herbs. Leaves radical or alternate. Corolla-lobes induplicate valvate in the bud
 1. Leaves simple, cauline deeply cordate .... LIMMANTHEMUM.
 2. Leaves 3-foliolate .... MENYANTHES.

Bitter, tonic, and febrifuge.

Bitter principles—chiratin, erythrocentaurin, gentianin, menyanthin, ophelic acid—predominate in the members of this Order, so that we find them used as tonics, among which they rank very high.

Mention also is to be made of the gentian glucosides—gentiaculin, gentiamarin, gentiin, gentiopicrin—.

OFFICIAL:—*Erythraea Centaurium* Pers. (Austria, Belgium, Holland, Switzerland)=*Centaurium umbellatum* Gilib. (Russia),—(Linne) Persoon (Germany, Hungary); *E. pulchella* Fr.=*Centaurium pulchellum* (Russia).

Gentiana spp. (Sweden); *G. centaureum* Brot. non Linn.= *Erythraea major* Hoffmseg. & Link. (Portugal); *G. lutea* Linn. (Austria, Belgium, Denmark, France, Germany, Great Britain, Holland, Italy, Japan, Norway, Russia, Switzerland, Turkey, United States),—var. *symphyandra* Murbeck (Hungary),=*Asterias lutea* Borkhaus (Portugal); *G. pannonica* Scopoli (Austria, Denmark, Germany, Hungary, Japan, Norway, Russia, Switzerland, Turkey); *G. punctata* Linn. (Denmark, Germany, Hungary, Japan, Russia, Switzerland, Turkey); *G. purpurea* Linn. (Denmark, Germany, Hungary, Japan, Norway, Russia, Switzerland, Turkey); *G. scabra* Bge. var. *Buergeri* Maxim. (Japan).

Menyanthes trifoliata Linn. (Austria, Denmark, France, Germany, Holland, Hungary, Norway, Russia, Sweden, Switzerland) =*Trifolium palustre* G. Bauh. (Portugal).

Ophelia Chirata Grisebach=*Agathotes Chirayta* D. Don. (Portugal).

Swertia chinensis Hemsl., *S. japonica* Makino (Japan).

EXACUM Linn.

Annual herbs. Leaves opposite, entire. Flowers in terminal and axillary usually dichotomous cymes. Calyx deeply 4-5-lobed; lobes keeled, winged or flat. Corolla blue, purple, or white; tube short, globose; lobes 4-5, ovate or oblong. Stamens 4-5 on the corolla-throat; filaments short, dilated at the base; anthers dehiscing by terminal pores at length extending into lateral slits. Ovary 2-celled; ovules many in each cell; style long; stigma capitate. Capsule globose, septicidally 2-valved. Seeds many, minute, reticulate.—Species 30.—Palæotropics.

A. Stem 4-angular. Corolla large, lobes 4, blue
   1. Corolla-lobes full azure-blue .... 1. *E. tetragonum.*
   2. Corolla-lobes white in the lower half, full azure-blue in the upper .... 2. *E. bicolor.*

B. Smaller slenderer plants with small 4-merous flowers
   1. Calyx-lobes winged on the back .... 3. *E. pedunculatum.*
   2. Calyx-lobes not winged on the back .... 4. *E. lawii.*

E. tenuifolium Aublet is used medicinally in Guiana.

1. **Exacum tetragonum** Roxb. Hort. Beng. (1814) 10.—PLATE 634..

Stems erect, 0.3-1.2 m., 4-sided, branching. Leaves opposite, stem-clasping, broadly lanceolate, 3.8-12.5 by 1.3-3.8 cm., acute. Flowers blue, 3.2 cm. diam., in terminal panicles. Calyx deeply 4-lobed; lobes ovate, keeled, long-pointed. Corolla-tube inflated, much shorter than the 4 ovate, acute lobes. Stamens 4, filaments short; anthers narrowly oblong, opening by two terminal pores. Ovary 2-celled; style long, stigma capitate; entire; ovules numerous. Capsule globose.

Distribution: Himalaya from Simla to Bhutan up to 5,000 ft., Upper Gangetic Plain, from Bengal and Chota Nagpur to the Central Provinces, N. Circars, Khasia Hills to Burma, Malay Peninsula—China, Borneo, Philippines.

The plant is used as a tonic in fevers and as a stomachic bitter.

Bengal: Kuchuri—; *Hindi:* Avachiretta, Titakhana—; *Santal:* Orkaphul—; *Tagalog:* Cantocanto—.

2. **Exacum bicolor** Roxb. Hort. Beng. (1814) 83; Wight Ic. t. 1321.—PLATE 635.

Annual, erect, reaching 60 cm. high; root fibrous; stem quadrangular, scarcely branched. Leaves very variable in size and form, sessile, 3.8-12.5 by 2-5 cm., ovate or elliptic or lanceolate, acute or obtuse, sometimes apiculate, 5-nerved, glabrous. Flowers showy, in copious terminal glabrous cymes; pedicels 6-20 mm. long; bracts lanceolate, acute. Calyx 1.3 cm. long, glabrous, deeply 4-partite; segments ovate, suddenly aristate-acuminate and with membranous margins, the kell furnished with a large veined wing which is more or less decurrent on the pedicel. Corolla reaching 3.2 cm. long (when expanded 5 cm. and more across); lobes reaching 2.5 cm. or more long, obliquely obovate, acute, the lower half white,

the upper blue. Anthers 8-13 mm. long, curved. Style 1.6-2 cm. long. Capsule 1.3 cm. long, ellipsoid, smooth and shining, tipped with the remains of the style, yellowish brown.

Distribution: Konkan, Deccan, S. M. Country, Madras Presidency: N. Circars, Mysore, Coimbatore, W. Ghats.

The plant possesses tonic and stomachic properties.

Hindi: Baracharayatah—.

3. **Exacum pedunculatum** Linn. Sp. Pl. (1753) 112.—PLATE 636.

Annual, erect, 7.5-45 cm. high; stem quadrangular, much-branched above. Leaves subsessile (distinctly petiolate in var. petiolare), 3.2-5 by 1-1.3 cm., elliptic or lanceolate, 3- or 5- nerved, glabrous, base usually tapering. Flowers in terminal much-branched cymes; peduncles and pedicels long, rigid; bracts lanceolate. Calxy 5-6 mm. long, 4-lobed, thinly membranous; lobes 3-4 mm. long, lanceolate, furnished with a large almost semicircular strongly nerved wing which is rounded and often subauricled at the base, more or less decurrent into the pedicel, produced at the apex into a fine point which is fused with the apex of the sepal so as to form a mucro. Corolla blue, 6-13 mm. long; lobes 4, lanceolate, acute, 4-8 mm. long. Stamens on the corolla-throat; filaments 0.85-1.5 mm. long; anthers 2.5-4 mm. long, oblong (not tapering), cordate at the base. Capsule globose, 4 mm. diam., smooth, shining.

Distribution: Throughout India, Ceylon, Burma, Malay Peninsula.

A good substitute for chiretta and gentian.

4. **Exacum lawii** C. B. Clarke in Hook. f. Fl. Brit. Ind. IV (1883) 98.

A small erect herb 5-12.5 (rarely reaching 15) cm. high. Stem slender, quadrangular, usually simple, but sometimes slightly branched near the top. Leaves sessile, small, 6 mm. long or less, often as broad as long, ovate, acute or subobtuse, thick, usually 3- (sometimes 5-) nerved, glandular-punctate. Peduncles terminal, quadrangular, 1.3-5 cm. long, usually 1-flowered. Calyx 4 mm. long, 4-partite; segments 3 mm. long, broadly ovate, acute, pellucido-

punctate, nerved, the midrib very strong. Corolla bluish purple, 6-8.5 mm. long; lobes broadly ovate. Filaments 1.6 mm. long, filiform; anthers yellow, 1.25 mm. long, oblong, not tapering, about half as broad as long. Capsule subglobose or ovoid, 3 mm. diam.

Distribution: W. Peninsula.

The powdered plant is given in kidney disorders.

The plant is boiled with oil and applied in eye-diseases.

ENICOSTEMMA Blume.

Erect or procumbent herbs. Leaves numerous, opposite. Flowers small, in axillary clusters. Calyx-tube campanulate; lobes 5, oblong or lanceolate. Corolla-tube long, the lower half cylindric, the upper half narrowly infundibuliform; lobes 5, small. Stamens 5, inserted at the middle of the corolla-tube; filaments filiform with a small double-hooded scale at the base; anthers erect, not twisted, acute. Ovary 1-celled; placentæ little intruded; ovules many; style short; stigma capitate. Capsule ellipsoid, septicidally 2-valved. Seeds many, globose, foveolate.—Species 4.—Madagascar, tropical America, tropical Africa and Asia.

The genus is bitter and stomachic.

1. **Enicostemma littorale** Blume Bijdr. (1826) 848.—*Adenema hyssopifolium* G. Don Gen. Syst. IV (1837) 201; Wight Ic. t. 600.—PLATE 637.

A perennial glabrous herb 10-50 cm. high, branched from the base; stems erect or procumbent, subquadrangular or subterete, glabrous. Leaves sessile, variable, 3.2-6.3 cm. by 3-16 mm., linear or linear-oblong or elliptic-oblong or lanceolate, obtuse or acute, glabrous, 3-nerved, the midnerve strong, the marginal nerves often obscure. Flowers sessile, in axillary clusters all along the stem. Calyx 3 mm. long; lobes 1.5 mm. long, ovate-oblong, obtuse, with narrow membranous margins. Corolla white, 6-8 mm. long, tubular; lobes 2.5 mm. long, lanceolate, acute. Capsule 4 mm. long, ellipsoid,

slightly narrowed at the base, rounded at the apex, apiculate with the remains of the style.

Distribution: Throughout the greater part of India, more frequent near the sea, Ceylon, not known from Bengal.—Malaya, tropical Africa, W. Indies.

The plant is pungent and very bitter; anthelmintic; cures fevers and "vata" diseases (Ayurveda).

The plant is very bitter and is much used as a stomachic in Madras. In addition to its tonic properties it is also somewhat laxative.

The plant is crushed and applied locally in snake-bite (Blatter).

Bengal: Nagajivha—; *Bombay:* Mamijwa, Naichapiala—; *Ceylon:* Vellarugu—; *Gujerati:* Madvinahi, Mamejavi, Mamejavo—; *Hindi:* Chhotakirayata—; *Kathiawar:* Mamejoo—; *Madras:* Vellarugu—; *Marathi:* Kadavinayi, Mamijva, Tanavadi—; *Sanskrit:* Krimihrita, Ksharakarma, Kshitaukshupa, Mabhijaka, Magajihva, Mamajaka, Mamejaka, Nagajivha, Nahu, Tiktapatra—; *Sind:* Manucha—; *Tamil:* Vallari—; *Telugu:* Nelaguli, Nelagulimidi—.

ERYTHRAEA Renealm ex Borck.

Annual or perennial erect branched herbs. Leaves opposite, sessile. Flowers rosy or white, in dichotomous often corymbose cymes. Calyx shortly or deeply 5- (rarely 4-) cleft; lobes keeled. Corolla-tube long or short; lobes 5 (rarely 4), spreading. Stamens 5 (rarely 4), inserted on the corolla-tube; filaments short; anthers usually exserted, erect, linear-oblong, often spirally twisted. Ovary 1-celled, the placentæ, however, often much intruded; ovules many; style filiform; stigma 2-lobed. Capsule oblong, 1- or almost 2- celled, 2-valved, many-seeded. Seeds minute, foveolate.—Species 30.—Chiefly temperate, rare in the tropics, extending to Chili and Australia.

Tonic and febrifuge.

The following species are used medicinally in Europe—*E. centaurium* Pers.—; in North America—*E. venusta* A. Gray.—; in

Chili—*E. chilensis* Pers.—; in Australia and New Caledonia—*E. australis* R. Br.

OFFICIAL:—The plant of *E. Centaurium* Pers. (Austria, Belgium, Holland, Switzerland)=*Centaurium umbellatum* Gilib. (Russia),—(Linne) Persoon (Germany, Hungary); *E. pulchella* Fr. =*Centaurium pulchellum* (Russia).

1. **Erythraea roxburghii** G. Don Gen. Syst. IV (1837) 206; Wight Ic. t. 1325.—PLATE 638B.

A small erect herbaceous plant 5-20 cm. high. Radical leaves rosulate, persistent, 20-25 by 3-6 mm., obovate or oblong, obtuse. Cauline leaves smaller, linear-oblong. Flowers in dichotomous cymes with a flower in each fork on a pedicel 6-13 mm. long. Calyx 8 mm. long; segments 5 mm. long, linear-subulate. Corolla 13-16 mm. long; tube 8 mm. long; lobes pink, 5 mm. long, elliptic, acute, spreading star-like. Anthers twisted at the apex. Stigma large, 2-lobed. Capsule exceeding 8 mm. long, narrowly oblong.

Distribution: Throughout India.

The whole plant is powerfully bitter, and held in high esteem as a stomachic.

It is used as a substitute for chiretta, especially in Bengal.

It is used by the Santals in fever (Campbell).

Bengal: Gima, Girmi—; *Bombay:* Kadavinai, Kurunai, Luntak—; *Gujerati:* Janglikariatu, Jhinkunkariatun—; *Hindi:* Barikchirayata, Charayatah, Khetachirayata—; *Marathi:* Lahankirayat, Lantak—; *Santal:* Gadasigrik—.

HOPPEA Willd.

Small much-branched glabrous herbs. Leaves opposite, small, sessile. Flowers shortly pedicellate or sessile, small, in 2-3-chotomous cymes. Calyx campanulate, membranous; lobes 4, lanceolate. Corolla tubular; lobes 4, more or less unequal. Stamens inserted in the throat of the corolla, 1 perfect, 3 barren; filaments short, filiform; anthers small, ovate, erect, with parallel cells. Ovary 1-celled, placentæ little intruded; style short; stigma subentire.

Capsule globose or ellipsoid, septicidally 2-valved. Seeds numerous, minute, obscurely reticulate.—Species 2.—India and Ceylon.

The genus is therapeutically inert.

1. **Hoppea dichotoma** Willd. in Ges. Naturf. Fr. Neue Schr. III (1801) 434.

A small divaricately branched herb 5-12.5 cm. high; stem and branches quadrangular, more or less winged. Leaves 6 by 3 mm., ovate, acute. Cymes dense or lax; pedicels short; bracts lanceolate. Calyx campanulate, 2.5-3 mm. long, membranous; lobes 1.5 mm. long, overtopping the corolla, lanceolate, very acute, with a strong green nerve at each margin. Corolla tubular, 2 mm. long, pale yellow; lobes half as long as the tube, ovate-oblong, obtuse. Anthers, 1 fertile, 3 barren. Capsule ellipsoid, 2 mm. long.

Distribution: Throughout India.

The plant is used in piles and in snake-bite.

Canscora Lam.

Much-branched erect annuals. Leaves opposite, sessile, petiolate or perfoliate. Flowers pink or white, in lax terminal cymes. Calyx tubular, 4-toothed; tube terete, ribbed or winged. Corolla-tube cylindric; lobes 4, more or less unsymmetric, imbricate in bud. Stamens 4, inserted at different heights on the corolla-tube, 1 (rarely 2) with longer filaments and larger and fertile anthers and inserted higher up than the others, which are usually barren; filaments short; anthers ovate or oblong. Ovary 1-celled; placentæ slightly intruded; ovules many; style filiform; stigma deeply 2-lobed. Capsule cylindric, membranous, septicidally 2-valved. Seeds reticulate-rugose.—Species 18.—Palæotropics.

1. Calyx triate or keeled, not winged. Pedicels not 4-winged .... 1. *C. diffusa.*
2. Calyx distinctly winged .... 2. *C. decussata.*

The genus is bitter and tonic.

1. **Canscora diffusa** R. Br. Prodr. (1810) 451 in Obs.—*C. Lawii* Wight Ic. t. 1327 (non C. B. Clarke).

A much-branched slender erect annual 15-60 cm. high (occasionally under favourable conditions of growth reaching 1.2 m. high); stems obtusely quadrangular, obscurely winged. Leaves membranous, 3-nerved, reticulately veined, the upper 10-16 by 6-10 mm., broadly ovate, acute, apiculate, rounded at the base, sessile, the lower 2.5-3.8 by 1.3-1.6 cm., elliptic, acute, much narrowed at the base petiolate. Flowers numerous, in lax diffuse paniculate cymes; pedicels filiform, 6-13 mm. long or even longer; bracts linear-subulate. Calyx 6 mm. long, not winged; teeth 4, lanceolate, acute, 2.5 mm. long. Corolla 1.3 cm. long; tube 6 mm. long, green; limb rosy, with a darker ring edged with white in the throat, 4-cleft, one of the divisions much less deep than the others; lobes unequal, ovate, obtuse. Stamens 4, one longer than the other 3, which are equal, the long stamen inserted higher up than the others. Capsule membranous, 5 mm. long, narrowly oblong.

Distribution: Throughout India, Ceylon.—Malaya, Australia, tropical Africa.

The plant is used as a nervine tonic.

Burma: Kyoukpan—; *Tagalog:* Cobamba—.

2. **Canscora decussata** Schult. Mant. III, 229.—Plate 638A.

An erect branching annual, up to 0.6 m. in height. Stems 4-winged, branches decussate. Leaves 2.5-3.8 cm. long, oblong, lanceolate, acute, 3-nerved. Cymes lax, the branches erect rigid, 4-winged. Flowers white, those in the forks long-pedicelled. Calyx 8-13 mm. long, 4-winged. Corolla-tube as long as the calyx; lobes 6 mm. long, obovate. Stamens as in preceding. Capsule and seeds rather larger.

Distribution: Himalaya ascending to 5,000 ft., and throughout India extending to Ceylon and Burma.—Tropical Africa.

The plant is bitter and pungent; oleagenous; heating, laxative, alexiteric, anthelmintic, nervine tonic; improves taste and appetite; cures " tridosha ", leucoderma, leprosy, tuberculosis, fevers; useful in inflammations, ascites, abdominal troubles, diseases of children (Ayurveda).

In Hindu medicine, this plant is regarded as laxative, alterative, and tonic, and is much praised as a nervine. It is also used in insanity, epilepsy, and nervous debility. The fresh juice of the plant is given in all cases of insanity, in doses of about an ounce.

Among the Mundas of Chota Nagpur, the herb is used as a fever remedy and as a vulnerary remedy.

Bengal: Dankuni, Shvetabona—; *Cutch:* Shunkhapushappi—; *Hindi:* Kalameg, Sankhahuli, Shankhini—; *Marathi:* Titavi, Yavotchi—; *Mundari:* Saharkapibihir, Tabenba—; *Sadani:* Bhuinim—; *Sanskrit:* Akshapida, Dandotpala, Dridhapada, Kambupushpi, Mahatikta, Maheshvari, Nakuli, Netramila, Patratanduli, Sankhapushpi, Shankhapushpi, Shankhini, Sukshmapushpi, Tikta, Tiktayava, Tunduli, Visarpini, Yashasvini, Yavatikta, Yavi—.

GENTIANA Tourn. ex Linn.

Annual or perennial herbs, sometimes woody below. Leaves opposite, often connate at base. Flowers blue, yellow or white, axillary or terminal, usually sessile. Calyx tubular, terete or rarely keeled, sometimes spathaceous; lobes 5 or 4. Corolla tubular campanulate funnel-shaped or subrotate; lobes 5-4, often with folds between the lobes. Stamens 5 or 4, attached at or below the middle of the tube, included; filaments linear, somewhat flattened below; anthers oblong or ovate. Ovary 1-celled, placentæ slightly intruded; ovules many; style usually short; stigma bilobed. Fruit a stalked or sessile, oblong or ellipsoid capsule, dehiscing septicidally. Seeds many, small, the testa reticulate.—Species 400.—Cosmopolitan, excluding Africa, chiefly alpine.

A. Corolla not more than 2.5 cm. at the time of expansion, without folds
    Corolla fimbriate in the throat .... 1. *G. tenella.*
B. Stoutish herbs. Flowers racemose or spicate. Corolla 2.5 cm. or more, 5-lobed with folds between the lobes
    1. Flowers solitary or few, racemose .... 2. *G. kurroo.*
    2. Flowers terminal, clustered and axillary .... 3. G. *decumbens.*
    3. The same as *decumbens* except for the equal calyx-lobes .... 4. *G. dahurica.*

The dried rhizome and roots are used as tonic-bitters.

The following species are commonly used in Europe—*G. amarella* Linn., *G. asclepiadea* Linn., *G. campestris* Linn., *G. cruciata* Linn., *G. lutea* Linn., *G. macrophylla* Pallas, *G. pannonica* Scop., *G. punctata* Linn., *G. purpurea* Linn.—; in China—*G. scabra* Bge.—; in Cambodia—*G. scandens* Lour.—; in Malaya—*G. indica* Steud., *G. rigescens* Franch.—; in North America—*G. elliottii* Chapm., *G. quinqueflora* Hill.—.

OFFICIAL:—The flower tops of *G. centaureum* Brot. non Linn. (*Erythraea major* Hoffmseg. & Link.) in Portugal.

The roots and rhizome of *G. spp.* (Sweden); *G. lutea* Linn. (Austria, Belgium, Denmark, France, Germany, Great Britain, Holland, Italy, Japan, Norway, Russia, Sweden, Switzerland, Turkey, United States);—var. *symphyandra* Murbeck (Hungary);=*Asterias lutea* Borkhaus (Portugal); *G. pannonica* Scopoli (Austria, Denmark, Germany, Hungary, Japan, Norway, Russia, Turkey); *G. punctata* Linn. (Denmark, Germany, Hungary, Japan, Russia, Turkey); *G. purpurea* Linn. (Denmark, Germany, Hungary, Japan, Norway, Russia, Turkey); *G. scabra* Bge. var. *Buergeri* Maxim. (Japan).

1. **Gentiana tenella** Fries in Act. Hafn. X, 436, t. 2, fig. 6.—PLATE 639C.

A herb. Stem 5-25 cm., erect or straggling, 4-lineolate, branched. Leaves 13 by 6 mm., oblong or ovate, lowest spathulate. Pedicels often 2.5-9 cm. long, terminal, solitary. Calyx-tube hardly any; lobes 5 by 2.5 mm., elliptic, often unequal. Flowers dirty violet, rarely white. Corolla tubular, 5-lobed, tube 13 by 4-5 mm., lobes 6 mm., elliptic. Capsule 1.7 cm. long, oblong-linear, sessile.

Distribution: Kashmir and W. Himalaya, 10,000—14,000 ft.—N. and Central Asia, arctic and alpine Europe.

Aitchison says that in Lahoul a decoction of the leaves and stems of this and other species is given in fevers.

Punjab: Tita—.

2. **Gentiana kurroo** Royle Ill. t. 68, fig. 2.—PLATE 639A.

Rootstock thick; stems tufted, decumbent, 10-30 cm. Leaves narrowly oblong; radical rosulate, 7.5-12.5 cm. by 6-13 mm.; stem-

leaves 2.5 cm., narrower. Flowers blue, spotted with white, 4.5-5 cm. long, 2 cm. diam., solitary or racemose. Calyx about half as long as the corolla; lobes 5, linear. Corolla 5-lobed. Capsule oblong.

Distribution: Kashmir, N.-W. Himalaya, 5,000—11,000 ft.

The plant has a bitter bad taste; blood tonic, emmenagogue; useful in syphilis and leucoderma (Yunani).

The root is medicinally used as a bitter tonic, and as substitute for the true Gentian. On the hills it is viewed as a febrifuge. Used principally as a *masala* for fattening horses. Acts as an aperient in larger doses. Said to diminish the fever of phthisis. Used for urinary affections.

Bengal: Karu, Kutki—; *Bombay:* Pakanbed, Phashanveda—; *Gujerati:* Pakhanbhed—; *Hindi:* Karu, Kutki—; *Punjab:* Kamal-phul, Nilakil, Nilkant—; *Urdu:* Nilkant—.

3 **Gentiana decumbens** Linn. f. Suppl. 174; Bot. Mag. tt. 705, 723.—Plate 639B.

Rootstock stout. Flowering stems 5-25 cm., simple. Radical leaves 5 cm. by 6-8 mm.; cauline leaves 2.5-3.8 cm., oblong or elliptic, connate at the base into a tube. Flowers 1-2, subsessile in each upper axil, the upper 3-7 approximate, subcapitate, the axillary clusters subremote or wanting. Calyx very unequal, often spathaceous or some of the teeth ovate, suddenly linear-pointed. Calyx-tube 8 mm.; lobes 5 mm. but the tube is often split one side nearly to the base; the lobes very unequal, 2-4 linear, 1-2 ovate, obtuse or obovate, with linear teeth. Corolla 2-2.5 cm., funnel-shaped, lobes rounded. Capsule 13 by 4 mm. stalk 6-8 mm. Seeds oblong, trigonous, falcate, twice as long as broad, subobtuse at both ends, testa close.

Distribution: Kashmir, 11,000—15,000 ft.—Dahuria, Siberia.

A tincture prepared of this plant has been used as a stomachic by the Lahoul missionaries (Stewart).

4. **Gentiana dahurica** Fisch. in Act. Soc. Nat. Scr. Mosq. III, 63.—*G. olivieri* Griseb. Gent. 278.

Only differs from *G. decumbens* by the equal calyx.

Distribution: W. Himalaya, Baluchistan.—Afghanistan, Dahuria, Soongaria, Persia, Mesopotamia.

At Kila Abdulla in Baluchistan, the plant is used as a sudorific (Hughes-Buller).

Khurasan Hills: Bangera—; *Kila Abdulla:* Agherpanrai, Bhangira—; *Quetta-Pishin:* Agherpanrae—.

SWERTIA Linn.

Annual or perennial herbs. Leaves opposite. Flowers blue, lurid, or white, sometimes with yellow nectaries, in terminal corymbose or paniculate cymes. Calyx deeply 4-5-partite; tube 0 or very short; segmgents acute or obtuse. Corolla subrotate; tube very short, broad; lobes 4-5, acute or obtuse with 1 or a pair of glandular nectaries at the base. Stamens 4-5, inserted at the base of the corolla and shorter than its lobes; filaments subulate or flattened; anthers oblong, versatile. Ovary 1-celled; placentæ slightly intruded; ovules many; style short or 0; stigma 2-lobed. Capsule ovoid or oblong, 2-valved. Seeds many, minute, compressed, often winged.—Species 90.—Cosmopolitan, excepting Africa.

Stems annual or once-flowering, erect, panicled, solid, virgate. Radical leaves absent at the time of flowering
- I. Flowers all or most of them 5-merous
  - a. Filaments dilated downwards, united into a short tube free from the corolla .... 1. *S. purpurascens.*
  - b. Filaments linear, separately attached to the corolla-tube .... 2. *S. paniculata.*
- II. Flowers all 4-merous
  - a. Calyx-lobes 4 mm. .... 3. *S. chirata.*
  - b. Calyx-lobes 6 mm. and upwards .... 7. *S. alata.*
  - c. Sepals often 13-17 mm. and more .... 4. *S. angustifolia.*
  - d. Sepals 6-8 mm. .... 6. *S. decussata.*
  - e. Sepals 8 mm., nectary with a fimbriate covering scale .... 8. *S. lawii.*

S. diluta Benth. & Hook. f. and *S. japonica* Makino are used medicinally in Japan; *S. chirata* Buch.—Ham. is used in the Transvaal.

OFFICIAL:—The plant, collected when in flower, and dried: *S. chinensis* Hemsl., *S. japonica* Makino (Japan).

1. **Swertia purpurascens** Wall. Cat. 4379.— PLATE 640B.

Stems 0.3-0.9 m.; branches spreading. Leaves oblong or lanceolate, 3.8-0.8 cm. Calyx and corolla 5-lobed. Corolla pale red-purple, a darker complete ring at its base; lobes reflexed; one gland on each lobe, horseshoe-shaped, naked.

Distribution: Temperate N.-W. Himalaya, 5,000—12,000 ft., from Kashmir to Kumaon.

Used as a substitute for true chiretta.

Hindi: Chirettah—.

2. **Swertia paniculata** Wall. Cat. 4374 and Pl. As. Rar. III, 3, t. 205.—PLATE 640A.

Stems 0.3-0.9 m.; branches spreading. Leaves oblong or lanceolate, 3.8 cm. by 8 mm. Calyx and corolla 5-lobed. Corolla white in the upper half with two purple blotches at the base forming an interrupted ring; one gland on each lobe, ovate, naked.

Distribution: Temperate W. Himalaya, 5,000—8,000 ft., from Kashmir to Nepal.

The plant is used as a substitute for true chiretta.

Marathi: Kadavi—.

3. **Swertia chirata** Ham. ex Wall. Cat. 4372.—PLATE 641B.

Stems robust, 0.6-1.5 m., branching, terete except near the top. Leaves broadly lanceolate, 10 by 3.8 cm., acute. Calyx and corolla 4-lobed. Corolla green-yellow, tinged with purple; two glands on each lobe, green, fringed with long hairs.

Distribution: Temperate Himalaya, 4,000—10,000 ft., from Kashmir to Bhutan, Khasia Hills, 4,000—5,000 ft.

The plant is bitter; cooling; anthelmintic, antipyretic, antiperiodic, laxative, galactagogue; cures thirst, biliousness, leucoderma, inflammations, burning sensations, pain in the body, urinary discharges, ulcers, asthma, bronchitis, leucorrhœa, piles, bad taste in the mouth; good for vomiting in pregnancy; causes " vata " (Ayurveda).

short; lobes 4-5 (rarely 6-8). Corolla various, 4-5- (rarely 6-many-) lobed, often with scales or folds in the throat; lobes imbricate (rarely plicate or contorted). Stamens as many as the corolla-lobes, inserted in the throat or tube of the corolla, equal or slightly unequal; filaments filiform or dilated at the base, sometimes with a basal scale; anthers ovate, oblong or linear, obtuse, or with produced connective, dorsifixed, more or less 2-lobed at the base, cells parallel, introrsely or laterally dehiscent. Disk annular, entire or 5-lobed, sometimes inconspicuous or obsolete. Ovary superior, confluent at the base with the disk, entire or more or less completely 2-4-lobed, 2-celled and 2-ovulate or 4-celled and 1-ovulate; ovules erect or attached to the inner angle of the cell; style terminal in the entire, gynobasic in the lobed ovary, filiform or columnar, entire or once or twice divided, or rarely partite into 2 styles; stigma terminal or annular, entire or 2-lobed. Fruit drupaceous or dividing into 2-4 nutlets. Seeds erect, oblique or almost horizontal, straight or curved; testa membranous; albumen copious, scanty or 0; embryo straight or curved; cotyledons flat, plano-convex or thick and fleshy, entire (rarely 2- fid or -plicate); radicle usually much shorter than the cotyledons.—Genera 100. Species 1800.—Tropical and temperate, especially Mediterranean.

A. Trees or shrubs. Style terminal on the entire ovary, twice bipartite. Drupe 4-1-seeded
   Calyx-teeth very short, irregular .... CORDIA.
B. Style terminal on the entire ovary, simple, bipartite, or styles 2. Drupe with 2, 2-celled or 4, 1-celled pyrenes or of 4-1 nuts
   I. Trees or shrubs. Style bifid .... EHRETIA.
   II. Prostrate herb. Styles 2 .... COLDENIA.
   III. Virgate shrub. Style 1. Stigma capitate .... ROTULA.
C. Style terminal on the entire ovary, depressed conic at the apex or with a horizontal ring below the stigmas
   Herbs. Style dilated at the apex or above the base .... HELIOTROPIUM.
D. Herbs. Style simple or bifid, rising from between the ovary lobes (except in TRICHODESMA). Nutlets 4, rarely 3-1 by suppression
   I. Nutlets attached to a convex or conical carpophore
      a. Anthers conically connivent, lanceolate, subexsert ...... TRICHODESMA.
      b. Stamens included. Nutlets obovoid, glochidiate .... CYNOGLOSSUM.
   II. Nutlets on a flat or nearly flat receptacle, scar basal
      a. Corolla closed inside by little obtuse scales .... CACCINIA.
      b. Corolla-throat naked or with small scales .... LITHOSPERMUM.
      c. Suberect herbs. Corolla purple, tube elongate .... MACROTOMIA.
      d. Anthers lanceolate, connivent in a cone .... ONOSMA.

A few members have a medicinal or sub-medicinal interest, being slightly diaphoretic and sometimes astringent. Most possess soft mucilaginous juices, which added to beverages impart to these a refreshing taste.

Two toxic alkaloids, consolidine and cynoglossine, have been isolated from *Cynoglossum officinale* Linn. The presence of symphytocynoglossin in *Symphytum officinale* Linn. has also been recorded.

OFFICIAL:—*Anchusa officinalis* Brot. non Linn.=*A. italica* Retzius, *A. undulata* Linn. (Portugal).

Borrago officinalis Linn. in France and Portugal.

Cynoglossum officinale Linn. (Denmark, France, Norway, Spain),—Brot. non Linn.=*C. clandestinum* Desfont. (Portugal).

Lithospermum fruticosum Linn.=*Anchusa angustifolia* G. Bauh. (Portugal).

Symphytum officinale Linn.=*S. patens* Sibthorp (Portugal).

CORDIA Linn.

Trees or shrubs rarely subscandent. Leaves alternate (rarely subopposite), petiolate, entire or toothed. Flowers polygamous (male and hermaphrodite), in cymes, spikes or heads. Calyx tubular or campanulate, smooth or ribbed; teeth usually 5, short, often irregular, sometimes obscure. Corolla infundibuliform, hypocrateriform, or campanulate, usually white or orange; lobes 4-8, imbricate, reflexed or spreading. Stamens as many as the corolla-lobes, exserted or included; filaments often hairy at the base. Ovary 4-celled; ovule solitary in each cell, erect; style terminal, elongate, bipartite, the branches again bipartite; stigma capitate or clavate. Fruit usually with viscid pulp, drupaceous, of 4 or fewer 1-seeded cells; putamen often bony. Seeds exalbuminous; cotyledons plicate; radicle short. —Species 280.—Warm countries.

A. Adult leaves glabrous or subvillous beneath, not tomentose (except in *C. wallichii*)
  I. Leaves 3- or 3-5- nerved at the base, lateral primary nerves few
    a. Leaves glabrous .... 1. *C. obliqua.*
    b. Leaves densely closed with stellate fulvous or white tomentum beneath .... 2. *C. wallichii.*

II. Leaves feather-nerved .... 3. *C. rothii.*
B. Adult leaves tomentose beneath
I. Leaves ovate or oblong-acuminate .... 4. *C. vestita.*
II. Leaves cordate-ovate, obtuse .... 5. *C. macleodii.*

The root is laxative; the bark and leaves tonic, stimulant, and febrifuge; the fruit emmollient and laxative.

The following species are used medicinally in Europe, Egypt, and West Africa—*C. myxa* Linn.—; in Persia—*C. gerascanthus* Linn.—; in Annam—*C. bentamensis* Blume, *C. sinensis* Lam.—; in Java—*C. obliqua* Willd.—; in the West Indies—*C. gerascanthus* Linn., *C. sebestana* Linn.—; in Guiana—*C. aubletii* DC.—; in Mexico —*C. boissieri* A. DC.—.

1. **Cordia obliqua** Willd. Phytogr. 4, t. IV (1794); C. B. Clarke in Hook. f. Fl. Brit. Ind. IV (1883) 137, excl. var.—*C. latifolia* Roxb. Fl. Ind. ed. Car. & Wall. II, 330.—*C. myxa* Roxb. l. c. 332; Wight Ill. t. 169; C. B. Clarke l. c. excl. var. (non Linn.).—Plate 646.

A middle sized tree, branchlets glabrous, wood soft, light grey, no heartwood. Leaves entire or slightly dentate, glabrous, but more or less rough when full grown, variable in shape, from elliptic-lanceolate to broad ovate, often with a rounded or cordate base, basal nerves 3, rarely 5, blade 3-6, petioles 2.5-5 cm. long. Flowers small, in large lax terminal axillary pedunculate almost glabrous cymes, peduncles 2.5-5 cm., buds nearly globose. Drupe 1.3-2.5 cm. long, when ripe yellowish brown, pink or nearly black, shining, but minutely rugose, endocarp rugose, very hard, in a sweetish viscid, almost transparent pulp.

Distribution: Widely spread over nearly the whole of the warmer parts of India and Ceylon (often cultivated). Malacca.—Indo-China, Hainan, Formosa, Java, Philippines, New Guinea, tropical Australia.

The fruit is sweetish; slightly cooling; anthelmintic, bechic; used as an expectorant, and astringent; valuable in all diseases of the lungs; used as a substitute for *C. Wallichii* (Ayurveda).

The fruit is sweet; pectoral, diuretic, anthelmintic, purgative, expectorant, maturant, vulnerary; useful in dry cough, diseases of

the chest and urethra, in biliousness and chronic fever; lessens thirst and the scalding of urine; causes suppuration; removes bad humours, pains in the joints, burning of the throat; good in diseases of the spleen (Yunani).

The juice of the bark, along with cocoanut oil, is given in gripes. The bark and also the unripe fruit are used as a mild tonic.

The kernels are a good remedy in ringworm. The leaves are useful as an application to ulcers and in headache.

The Santals use a powder of the bark as an external application in prurigo.

The Javanese use the bark in fevers.

Every part of the plant is recommended for the treatment of snake-bite (Sushruta, Vagbhata, Yogaratnakara, Bapat) and scorpion-sting (Sushruta, Vagbhata); but every part is equally useless in the antidotal treatment of either snake-bite (Mhaskar and Caius) or scorpion-sting (Caius and Mhaskar).

Arabic: Dabak, Dabk—; *Baigas:* Lasseri—; *Bengal:* Bahubara, Bohari, Bohodari, Buhal, Chhotobohnaari—; *Bombay:* Bargund, Bhokar, Bhokara, Geduri, Goden, Gondan, Gondani, Lesurigeduri, Pistan, Sapistan, Semar, Sepistar, Vargund—; *Burma:* Thanat, Toungthanat—; *Canarese:* Challangayi, Challe, Chella, Chikkachalle, Chotte, Hadige, Kaduchalle, Mannadike—; *English:* Sebesten Plum—; *French:* Bois à baguettes, Bois chik, Bois de chine, Bois de rose de la Martinique, Sebestier—; *Gond:* Selte—; *Gujerati:* Gundomoto, Lepistan, Pistan, Racegundo, Rayagundo, Vadgunda—; *Hasada:* Rasirka—; *Hindi:* Bhairala, Bhokar, Chhotalaslasa, Chhotalasora, Gondi, Guslasah, Lasora, Lasura, Lessora, Rasalla—; *Kadir:* Karadi, Karati—; *Khond:* Bohurolo, Pajipotong—; *Kolami:* Embrum—; *Konkani:* Nilti—; *Kumaon:* Bairala, Baurala, Borla, Sisara, Sisora—; *Kurku:* Silu—; *Lepcha:* Minat, Nimat—; *Madras:* Perunaruvuli—; *Magha:* Chaine—; *Malay:* Sekendai, Sekundah—; *Malayalam:* Celu, Ceruvannichi, Cheruviri, Karati, Madaviriyasam, Vidi, Virasham, Viri, Viriyasam—; *Marathi:* Bargund, Bhokar, Bhokara, Bhokur, Chokri, Goden, Gondan, Montabhokar, Shelu, Sherti, Semar,

Vargund—; *Mechi:* Dobakari, Toba—; *Naguri:* Buc—; *Nepal:* Aulebohori, Bœri, Bohori—; *North-Western Provinces:* Koda—; *Persian:* Sapistan, Sugpistan—; *Punjab:* Laswara—; *Rajputana:* Lasora—; *Ramnagar:* Bherao—; *Sadani:* Buc—; *Sanskrit:* Bahuvaraka, Bhukampadaruka, Bhukarbudara, Bhuselu, Bhutadruma, Kshudrashleshmataka, Laghupichhila, Laghushelu, Laghushita, Laghushleshmataka, Madhubhutadruma, Sukshmaphala—; *Santal:* Buch—; *Sind:* Giduri, Lesuri—; *Sinhalese:* Lolu, Lotu—; *Spanish:* Mija de la India, Sebesten de Egipto—; *Tamil:* Naruvili, Selu, Sirunaruvili, Vallagu, Vidi, Viri, Virisu, Viriyan—; *Telugu:* Bankanakkera, Chinnabotuku, Chinnanakkera, Inki, Nakkera, Nakkeri, Nekkara, Urunakkera, Virigi—; *Tulu:* Challangayi—; *Urdu:* Lasora—; *Uriya:* Amobhoto, Bohurolo, Domolo, Gondi, Kophokoturi—.

2. **Cordia Wallichii** G. Don Gen. Syst. IV (1837) 379.—*C. obliqua* var. *Wallichii* C. B. Clarke in Hook. f. Fl. Brit. Ind. IV, 137.—*C. obliqua* Wight Ic. t. 1378.—Plate 647B (under *C. obliqua* var. *Wallichii*).

A moderate sized tree. Leaves 10-12.5 cm. long and about as broad as long, orbicular-ovate, glabrous or nearly so and without white discs (cystoliths) above, densely clothed with stellate, fulvous or white tomentum beneath, base subcordate or truncate, rarely shortly cuneate, 3-5- (usually 3-) nerved; petioles 2.5-3.8 cm. long. Flowers white, in terminal and lateral paniculate cymes. Calyx 6-8 mm. long, closed round the corolla in bud, irregularly splitting into 5 lobes on the expansion of the flower, pubescent inside; tube slightly tomentose or nearly glabrous; the teeth densely tomentose. Corolla about twice as long as the calyx. Filaments hairy at the base. Drupe ovoid, long-acuminate.

Distribution: Gujarat, N. Kanara, Deccan, W. Ghats of Madras Presidency.

The plant is bitter, sweet, acrid; cooling, stomachic, anthelmintic, alexiteric; good for the hair; useful in pains, biliousness, ulcers; causes "kapha".—The unripe fruit is sweet, bitter, acrid; cooling; increases "vata"; improves taste; reduces biliousness; cures diseases

of the blood, bronchitis.—The ripe fruit is sweet, oleagenous; cooling, fattening, indigestible; cures "vata", biliousness, diseases of the blood (Ayurveda).

A decoction of the root is given as a gargle in stomatitis.—The leaves are aphrodisiac; used in gonorrhœa; their ashes are vulnerary and used as a wash in burning of the eyes.—The fruit is sweet and has flavour; diuretic, anthelmintic, antipyretic; good for inflammations of the chest and throat, dry cough, loss of voice, pharyngitis, thirst, biliousness; useful in strangury and the scalding of urine (Yunani).

The fruit is used as an expectorant and astringent. In Sind, it is regarded as demulcent.

The fruit in its raw state contains a gum used beneficially in gonorrhœa.

Demulcent, said to be useful in bronchial affections and in irritation of the urinary passages. A decoction of the fruit was administered to cases of bronchitis with negative results (Koman).

Arabic: Mokhatah, Mukhitah—; *Bengal:* Bahubara, Bohari, Bohodari, Buhal—; *Bombay:* Burgund, Duhiwur, Motabhokar—; *Burma:* Tana, Tanusi—; *Canarese:* Challe, Doddachalle—; *Deccan:* Gondni—; *English:* Large Sebesten—; *Gujerati:* Gadgundi, Nanugundi, Pisten, Sepisten, Vargund—; *Hindi:* Buralessura—; *Malayalam:* Naruviri, Periyaviri, Valiyavanichhi—; *Persian:* Sagpistan, Sapistan, Sapistaneekhurd—; *Sanskrit:* Bahuvaraka, Bahuwara, Bhutadruma, Bhutavriksha, Dvijakutsita, Gandhapushpa, Karbudara, Karbudaraka, Lekhashataka, Pichhila, Selu, Shailu, Shapita, Shataka, Shelu, Shitala, Shitaphala, Shleshmata, Shleshmataka, Uddala, Uddalaka—; *Sind:* Geduri, Giduri—; *Tamil:* Ali, Namaviri, Naruvili, Perunaruvili, Sidam, Veniru, Vidi, Viri, Viriyan—; *Telugu:* Kichavirigi, Kondavirigi, Nakkera, Peddabotuku, Peddanakkera—; *Urdu:* Gondani—.

3. **Cordia rothii** Roem and Schult. Syst. IV (1819) 798; Wight Ic. t. 1379.—PLATE 648.

A small tree 6-12 m. high; bark grey, furrowed. Leaves subopposite, 6.3-10 by 2-3.2 cm., oblanceolate-oblong, rounded at the

apex, rough above, more or less pubescent beneath, inconspicuously feather-nerved (not 3-nerved at the base), base tapering into the petiole; petioles 1.3 cm. long. Flowers small, white, usually tetrandrous, in lax terminal or axillary pedunculate cymes; peduncles 2-2.5 cm. long; pedicels short. Calyx 4-5 mm. long, veined, obconic at the time of flowering, minutely pubescent outside and with shining silky hairs inside; lobes obtuse, small. Corolla 6 mm. long; lobes usually 4, equalling the tube, oblong, obtuse, reflexed. Filaments glabrous. Drupe usually 1-seeded, ovoid, acute, mucronate, 1-1.3 cm. long, glabrous, longitudinally striate, yellow or reddish brown when ripe, with a gelatinous pellucid edible pulp.

Distribution: Punjab, Sind, Rajputana, Gujarat, Deccan, Carnatic, Ceylon.—Arabia, Abyssinia.

The decoction of the bark possesses astringent properties and is used as a gargle.

Bombay: Gondani, Gondui, Gundi, Gundni—; *Canarese:* Kirichalle—; *Drabbi:* Lesuro—; *Gujerati:* Gundi, Liyargundi—; *Hindi:* Gondi, Gondni, Gundi—; *Konkani:* Gundi—; *Madras:* Sirunaruvuli—; *Marathi:* Gondani—; *Punjab:* Gondi—; *Rajputana:* Gondi, Gundi—; *Rindli:* Lesuro—; *Sanskrit:* Laghushleshmataka—; *Shoran:* Livar—; *Sind:* Liai, Liar, Liari, Lijar—; *Tamil:* Nariviri, Naruvili, Sandanamamani, Selu—; *Telugu:* Chinnabotuku, Chinnavirigi, Pachchabotuka—.

4. **Cordia vestita** Hook. f. & Th. in Journ. Linn. Soc. II (1858) 128.—Plate 647A.

A small deciduous tree with a low rounded crown, up to 9 m. high; young parts, underside of leaves and inflorescence clothed with grey or fulvous pubescence. Bark grey or greenish, smooth, exfoliating when old in large woody scales, inner bark silvery-grey. Leaves coriaceous, scabrous above, tomentose beneath until mature, usually 3-nerved from near the base; petioles 2.5-3.8 cm. long. Flowers pedicelled, yellowish white, in dense compound cymes, the male flowers usually in unilateral racemes. Calyx tubular-clavate, about 1.3 cm. long, teeth unequal. Corolla-tube 8 mm. long, equalling the calyx; lobes ovate-oblong, spreading, as long as the tube. Drupe

1.3-1.7 cm. long, ellipsoid, acute, supported by the saucer-shaped or campanulate strongly ribbed accrescent calyx.

Distribution: Punjab, westwards as far as the Jhelum, sub-Himalayan forests from Dehra Dun and the Siwalik Range eastwards to the Sarda River in N. Oudh.

The fruit is used as a demulcent, expectorant, and astringent.

Dehra Dun: Bairola, Barula—; *Garhwal:* Bairola, Bairula, Barula—; *Hindi:* Ajanta, Bairola, Bairula, Berula, Chinta, Indak, Kum, Kumbi, Kumpaiman, Latora, Pin—; *Punjab:* Karuk, Kumbi—; *Ramnagar:* Bariul—; *Saharanpur:* Kum—.

5. **Cordia macleodii** Hook. f. & Th. in Journ. Linn. Soc. II (1858) 128.—PLATE 649.

A tree 9-12 m. high; trunk reaching 60 cm. diam.; bark smooth, white, soft. Leaves alternate or sometimes almost subopposite, firm and hard when mature, 5-15 cm. long, and nearly as broad as long, ovate, obtuse, 3-5-nerved at the base, the upper surface pubescent when young, rough but shining, usually with white disc, and with impressed nerves when old, the lower surface densely clothed with grey or tawny woolly tomentum consisting of more or less branched (hardly stellate) hairs; the basal as well as the secondary and transverse tertiary nerves prominent; petioles 2.5-5 cm. long, densely woolly-tomentose. Flowers polygamous, subsessile, in dense paniculate terminal and axillary tomentose cymes; male flowers with a rudimentary ovary but without style or stigma. Calyx 8 mm. long, obconic, densely tomentose, ribbed; lobes short, obtuse. Corolla 1.6 cm. long; lobes 8 by 2.5-3 mm., exceeding the tube, spathulate-oblong, obtuse, veined. Stamens usually 6 , exserted; filaments hairy at the base; anthers of male flowers large, those of the hermaphrodite flowers smaller. Drupe 1.3-2 cm. long, ovoid, acute, supported on the cup-shaped ribbed tomentose persistent crenate or denticulate calyx, not edible.

Distribution: Chota Nagpur, Central India, Konkan, N. Kanara, Deccan, Carnatic.

The Santals use the bark in jaundice (Campbell).

Ajmere: Gadru, Godela—; *Canarese:* Bilichalle,, Challe, Doddachalle, Hadang, Hirichalle—; *Coorg:* Gavudi, Modhasi—;

Gond: Bot—; *Hindi:* Dahi, Dahipalas, Dengan, Dewas, Dhagan, Dhaian, Dhaiman, Dhaman, Dhengan, Dihgan—; *Karwar:* Belaunan, Bharwar—; *Khond:* Bohurolo—; *Kolami:* Porponda, Reuta—; *Kurku:* Kassamar, Lauri—; *Marathi:* Bhoti, Daiwas, Dhaim, Dhaiwan, Dhaman—; *Merwara:* Godela—; *Rajputana:* Gondu—; *Santal:* Jugia—; *Sattara:* Dhaiwan—; *Tamil:* Palandekku—; *Telugu:* Botuku, Peddabattava, Peddabotuku—; *Uriya:* Bhoto, Bohurolo—.

EHRETIA Linn.

Trees or shrubs, glabrous, pubescent, or scabrous. Leaves alternate. Flowers small, usually white, in terminal and axillary corymbose cymes or panicles, rarely solitary. Calyx small, 5-partite. Corolla-tube short; lobes 5, spreading, imbricate. Stamens 5, inserted on the corolla-tube, usually exserted; filaments filiform; anthers ovate or oblong. Ovary 2-celled with 2 ovules in each cell, or 4 celled with 1 ovule in each cell; style terminal, 2-fid or 2-partite, or styles 2; stigma capitate or clavate. Drupe small, subglobose, 4- (or by suppression 3-1-) seeded; endocarp hard, consisting of 1 four-celled or 2 two-celled or 4 one-celled pyrenes (3-1 pyrenes or cells sometimes suppressed). Seeds straight; albumen scanty; cotyledons ovate or oblong, not plicate.—Species 40.—Tropics, chiefly of the Old World.

1. Style single, bifid. Leaves quite entire .... 1. *E. aspera.*
2. Styles 2, undivided or one sub-2-partite .... 2. *E. microphylla.*

E. microphylla Lam. is used medicinally in the Philippine Islands, *E. cymosa* Schum. & Thonn. in the Gold Coast.

1. **Ehretia aspera** Willd. Phyt. 4, t. II, fig. 1; Roxb. Corom. Pl. t. 55.—*E. obtusifolia* Hochst. ex DC. Prodr. IX (1845) 507.—*E. leavis* Roxb. var. *aspera* C. B. Clarke in Hook. f. Fl. Brit. Ind. IV, 142.—PLATE 650A (under *E. obtusifolia* Hochst.).

A shrub; branches usually glabrous, short, terete. Leaves very variable, 2-6.3 by 1.3-3.8 cm., elliptic-oblong or obovate, rounded or shortly acuminate, sometimes retuse, scabrous, slightly hairy or globose above, persistently hairy beneath; petioles 6-20 mm. long.

Flowers white, in paniculate cymes which are at first close, corymbose and apparently terminal, afterwards lax and lateral. Calyx 2.5 mm. long, hairy outside; segments 1.5 mm. long, ovate-oblong, subacute, ciliate. Corolla 6-8 mm. long; tube longer than the calyx; lobes about equalling the tube, oblong, obtuse. Ovary ovoid; style 5-6 mm. long, bifid about $^1/_3$ the way down; stigmas capitate. Drupe depressed-globose, 6 mm. across; pyrenes usually 4, bony.

Distribution: Punjab, Salt Range, Sind, Baluchistan, Rajputana Desert, Deccan, Carnatic, Burma.—Afghanistan, Abyssinia.

A decoction of the fresh root is used in venereal diseases.

Baluchistan: Kanero, Manak—; *Bias:* Chamar—; *Jhalawan:* Kahiro—; *Las Bela:* Sio—; *Marathi:* Datrangi, Kupta—; *Merwara:* Tambolia—; *Pab Hills:* Puzogowangir—; *Punjab:* Chamror—; *Pushtu:* Khabarra, Kharawune, Lor, Maraghune, Tutiri—; *Ravi:* Gin—; *Salt Range:* Barikander, Dhaman, Ganger, Saggar, Sakkur—; *Sind:* Chambal—.

2. **Ehretia microphylla** Lam. Table Encycl. I, 425.—*E. buxifolia* Roxb. Corom. Pl. I (1795) 42, t. 57.—Plate 650B (under *E. buxifolia* Roxb.).

A small shrub 0.9-1.2 m. high; branches numerous, slender, divaricate; bark reddish brown, cracked. Leaves numerous, subsessile, fascicled on arrested branchlets, 1-2.5 cm. by 4-8 mm., obovate, cuneate, rounded and sometimes with a few crenatures at the apex, rough above with short bristly hairs with a white spot at the base of each when dried, shining and polished above, paler and with conspicuous venation beneath. Flowers white, axillary, solitary or 2 together on slender hairy peduncles 0.8 mm. long. Calyx hairy, 2.5 mm. long; segments 1.5 mm. long, lanceolate or spathulate-oblong, acute. Corolla 5 mm. long, campanulate; lobes 2.5 mm. long, broadly ovate, obtuse, spreading or recurved. Stamens exserted. Styles 2, longer than the stamens, undivided, or 1 style 2-partite to near the base. Drupe 4 mm. diam., globose, apiculate, shining, scarlet; pyrene 1, four-celled.

Distribution: N. Circars, Deccan, Carnatic, Ceylon.—Malaya to Formosa and the Philippines.

The root is employed in Southern India as an alterative and as an antidote to vegetable poison.

Bicol: Putputay—; *Bombay:* Pala—; *Canarese:* Bute, Ennebutige—; *Deccan:* Pale—; *English:* Ceylon Boxwood—; *Hindi:* Pala—; *Marathi:* Pala—; *Sinhalese:* Hintambala—; *Tagalog:* Alangitingit, Alanguit, Buyocbuyoc, Chambundoc, Mangit, Manguit—; *Tamil:* Kattuvettilai, Kuruvingi—; *Telugu:* Bapanaburi, Barranki, Buri, Pichaka, Pichakaburi, Pichikabira, Pittapisunukayi—; *Uriya:* Kujapponno, Ponnomari—; *Visayan:* Alangitingit, Mangit, Manguit—.

Coldenia Linn.

Branched usually diffuse or prostrate herbs. Leaves alternate, small, crisped. Flowers white or yellow, axillary, sessile or nearly so, the upper sometimes in a 1-sided leafy spike. Calyx 4-5-partite; segments lanceolate or linear. Corolla-tube short, rather broad, naked or with 4-5 scales within; lobes 4-5, spreading, imbricate in bud. Stamens 4-5, inserted on the corolla-tube, included; filaments short; anthers ovate. Ovary ovoid, slightly 4-lobed, 2-celled with 2 ovules, or sub-4-celled with 1 ovule in each cell; style 2, distinct from the base or cohering to the middle, but easily separable, terminal; stigmas capitate. Drupe almost dry, of 4 subconnate 1-seeded pyrenes. Seeds exalbuminous or with scanty albumen; cotyledons flat, broad; radicle short, straight, incurved or incumbent on the cotyledons.—Species 15.—Tropics and subtropics.

The genus is therapeutically inert.

1. **Coldenia procumbens** Linn. Sp. Pl. (1753) 125.—Plate 651C.

A procumbent herb usually lying quite flat on the ground; stems reaching 45 cm. long, shaggy with white hairs; branches often numerous; young parts silky with white hairs. Leaves crisped, 1.3-3.8 by 0.6-2 cm., obovate-oblong, rounded at the apex, coarsely serrate or subpinnatifid, very hairy on both sides, base tapering; petioles 3-10 mm. long, shaggy. Flowers pale yellow, solitary, axillary, nearly sessile. Calyx divided to the base or nearly so, very

hairy; segments 4, ovate, acute, 2-5 mm. long, ciliate. Corolla 2.5 mm. long; lobes 4, oblong, rounded at the apex, 1.5 mm. long. Stamens 4, scarcely higher than the corolla-tube. Fruit a dry 4-lobed pyramid about 3 mm. high and 4 mm. across at the widest part, grooved on two and ribbed on the other two sides, with a sharp central double beak, hairy, muriculate, ultimately separating into 1-celled beaked pyrenes. Seeds albuminous.

Distribution: Throughout India in moist places, Ceylon.—Tropics generally.

As a medicine, equal parts of the dry plant and fenugreek seeds rubbed to a fine powder, and applied warm to boils, quickly brings them to suppuration.

The fresh leaves ground up are applied to rheumatic swellings.

Bombay: Tripakshi—; *Ceylon:* Serappadi—; *English:* Trailing Coldenia—; *Gujerati:* Basriookharad—; *Hindi:* Tripungki, Tripunkhi—; *Marathi:* Tripunkhi—; *Sanskrit:* Tripakshi—; *Sind:* Bursha—; *Tagalog:* Oreganolalaqui, Tapiasin—; *Tamil:* Serupadi, Sirupadi—; *Telugu:* Hamapadi, Hamsapadu—.

ROTULA Lour.

A shrub with virgate branches. Leaves small, alternate or fascicled, entire or obscurely toothed. Flowers small, few, on short lateral branchlets, between the leaves, sometimes laxly racemose; bracts 2. Calyx 5-partite; lobes lanceolate, acuminate, imbricate. Corolla-tube short, campanulate; lobes 5, oblong, imbricate in bud. Stamens 5, on the corolla-tube; anthers oblong or ovate. Ovary ovoid, 2-celled with 2 ovules or 4-celled with one ovule in each cell; style filiform, simple; stigma capitate. Fruit a drupe with 4 crustaceous 1-seeded pyrenes. Seeds oblong; testa membranous; albumen scanty; cotyledons ovate.—Species 1.—Tropics.

The genus is not therapeutically defined.

1. **Rotula aquatica** Lour. Fl. Cochinch. 121.—*Rhabdia lycioides* Mart. Nov. Gen. & Sp. II (1826) 137, t. 195.—*Ehretia cuneata* Wight Ic. t. 1385.

A small much-branched shrub 0.6-1.8 m. high; branches virgate, with numerous short lateral arrested branchlets; young parts pubescent.

Leaves 6-25 by 3-6 mm. nearly sessile, crowded or fasciculate, spathulate, usually rounded at the apex, sometimes very shortly apiculate, usually entire, more or less hairy or glabrous, rarely densely hispid; petioles very short. Flowers pink, shortly pedicellate, solitary or 2 or 3 terminating short lateral branches; bracts at the base of the pedicels lanceolate, acute. Calyx 5 mm. long, more or less hairy, somewhat fleshy, divided almost to the base; segments 5, imbricate, the 3 outer slightly larger than the 2 inner, all ovate-lanceolate, acuminate, ciliate. Corolla nearly 8 mm. long; lobes twice as long as the tube, oblong, rounded at the apex, spreading. Stamens exserted beyond the corolla-tube; filaments 3 mm. long; Ovary ovoid; style 4 mm. long; stigma capitate or minutely 2-lobed. Fruit 3 mm. diam., nearly dry, subglobose, shorter than the persistent calyx, tipped with the remains of the style, orange when ripe.

Distribution: Throughout India in river-beds, Ceylon.—Tropical S. E. Asia, Africa, Brazil.

The root is used medicinally in piles, stone in the bladder, and venereal diseases.

Sanskrit: Pashanabheda—.

Heliotropium Linn.

Herbs or undershrubs (rarely shrubs), villous or scabrid, rarely quite glabrous. Leaves alternate (rarely subopposite). Flowers usually small, often unilateral along the branches of forked terminal scorpioid cymes, sometimes all axillary or arranged in simple leafy racemes. Calyx more or less deeply 5-cleft; lobes linear or lanceolate. Corolla-tube cylindric, usually naked at the throat; lobes 5, imbricate or induplicate, usually spreading in flower. Stamens 5, inserted in the corolla-tube, included; filaments very short; anthers ovate, oblong or lanceolate, obtuse, mucronate, or with a small discoid appendage at the apex. Ovary completely or imperfectly 4-celled, 4-ovulate; ovule pendulous from the inner angle of the cell near its apex; style terminal, short or long, usually with a depressed conic or broad stigmatic ring below the apex. Fruit somewhat fleshy,

2- or 4- sulcate or -lobed, at length dividing into 4 distinct or geminately cohering nutlets (sometimes 1 or 2 of the nutlets suppressed). Seeds straight or curved; albumen usually scanty; cotyledons plano-convex; radicle short.—Species 220.—Tropical and temperate.

A. Leaves obovate or elliptic, silky, scarcely scabrous. Flowers sessile .... 1. *H. eichwaldi.*
B. Leaves lanceolate, bristly; margins crisped, crenulate. Flowers sessile, ebracteate .... 2. *H. tuberculosum.*
C. Leaves small or very narrow
  1. A perennial herb .... 3. *H. strigosum.*
  2. An undershrub .... 4. *H. brevifolium.*
D. Fruit mitriform, subacutely 4-pointed .... 5. *H. indicum.*

Emollient. Useful in the treatment of ulcers, wounds and local inflammations.

The following species are used medicinally in Europe—*H. europaeum* Linn., *H. peruvianum* Linn., *H. supinum* Linn.—; in Cochin China and Porto Rico—*H. indicum* Linn.—; in California and Brazil—*H. curassavicum* Linn.—; in West Africa—*H. indicum* Linn., *H. ovalifolium* Forsk., *H. tuberculosum* Boiss., *H. zeylanicum* Lam.—.

1. **Heliotropium eichwaldi** Steud. ex DC. Prodr. IX (1845) 535.—Plate 652A.

Herbaceous, erect, branched from a woody base; stems and branches clothed with soft hairs usually arising from glistening bulbous bases. Leaves 2.5-4.5 by 1.3-2.5 cm., elliptic-oblong or obovate, usually obtuse, hairy on both sides with hairs usually arising from small glistening bulbous bases, base usually tapering; nerves more or less conspicuous beneath; petioles of the lower leaves reaching 2.5 cm. long or more, those of the upper leaves much shorter. Flowers usually 2-ranked, in dense geminate or ternate ebracteate spikes which are short and helicoid at the apex when young, reaching about 5 cm. long when older. Calyx densely hairy on both sides, divided almost to the base; segments 2.5-3 mm. long, ovate-lanceolate, acute. Corolla 4-5 mm. long; tube pubescent outside, glabrous inside; lobes 1.25 mm. long, orbicular-oblong, with undulate margins and often with intermediate teeth between the lobes. Stamens inserted below the middle of the corolla-tube; anthers 1.5 mm. long,

linear-oblong, rounded at the tip. Style scarcely any; stigma 1.25 mm. long the conical appendage broad at the base, acute and bifid at the apex, the stigmatic ring not conspicuous. Fruit usually leaving the calyx behind when falling; nutlets 4, ellipsoid, obtuse at both ends, 2 mm. long, minutely verrucose and finely puberulous.

Distribution: Kashmir, Punjab, Rajputana Desert, Sind, Baluchistan.—Persian, Baluchistan, W. and Central Asia, Australia.

The plant is emetic, and also given after snake-bite; and, along with tobacco-oil, is applied locally to the bite itself (Stewart).

The leaves boiled in a little castor oil, said to relieve pain of scorpion-bite or bee-stings, also the bite of mad-dogs. For cleansing and healing ulcers also of service (Murray).

The leaves, rolled up and put into the ears, are said to cure ear-ache (Blatter).

The plant is useless in the symptomatic treatment of snake-bite (Mhaskar and Caius) and scorpion-sting (Caius and Mhaskar). It is also useless as an external application.

Hindi: Atwin, Bithua, Gidartamaku, Nilkattai, Popatbuti—; *Kachhi:* Popat—; *Loralai:* Pangiwalibuti—; *Punjab:* Atnun, Bithua, Gidartamakku, Nilkattei, Popatbuti—.

2. **Heliotropium tuberculosum** Boiss. Fl. Or. IV (1879) 147.—*H. undulatum* Vahl Symb. I, 13 (probably).—PLATE 652C (under *H. undulatum* Vahl).

Erect, rigid, 15-50 cm. high from a woody base, turning black in drying, very harsh and scabrid with stiff white hairs springing from white tubercular bases; branches leafy, erect. Leaves 1.3-5 cm. by 2.5-8 mm., subsessile, lanceolate, acute, densely clothed with stiff hairs from white bulbous bases, margins more or less crenulate, often revolute, base tapering. Flowers usually 2-ranked, in solitary conjugate or sometimes paniculately arranged dense short spikes. Calyx rather more than 3 mm. long; segments 2.5 mm. long, linear-lanceolate, acute or subobtuse, densely hairy outside with long stiff hairs, slightly hairy inside and with more or less membranous margins. Corolla tubular, 4 mm. long, densely hairy outside; tube scarcely swollen at the middle; limb crisped and plicate, truncate, scarcely

distinctly lobed. Stamens inserted about the middle of the corolla-tube; anthers 1 mm. long, subsessile, narrowly linear-lanceolate. Style 1 mm. long; stigma 1.25 mm. long, the apex conical, slightly pubescent, shortly bifid, the stigmatic ring conspicuous. Fruit about 2.5 mm. long and as broad as long, glabrous or softly hairy; nutlets connate by pairs (sometimes more or less easily separable into 4).

Distribution: Sind, Rajputana Desert, Baluchistan.—Persian Baluchistan.

The plant is given after snake-bite, while tobacco-oil is locally applied to the bite itself (Stewart).

At Ormara, the plant is considered a cure for camels' bad eyes (Hughes-Buller).

The plant is not an antidote to snake-venom (Mhaskar and Caius).

Ormara: Marand—; *Punjab:* Jatimisak, Pipatbuti—.

3. **Heliotropium strigosum** Willd. Sp. Pl. I, 743.—Plate 651B.

A small much-branched usually procumbent, strigose perennial herb, woody at the base. Branches few, slender. Leaves 1.3-2.5 cm. long, linear, becoming smaller upwards. Flowers less than 2.5 mm. long; bracts linear or the lowest leaf-like. Calyx-lobes ovate, acute, enlarging in fruit. Corolla salver-shaped. Stigma narrowly conical. Fruit depressed at the apex, of 4 minute more or less united glabrous or slightly hairy nutlets.

Distribution: W. Himalaya and throughout India and extending to Baluchistan, Burma.—Malaya, China, Australia.

The plant is laxative and diuretic. The juice is used as an application to sore eyes, gum boils, and sores generally, to promote suppuration.

The plant is considered a cure for the sting of nettles and insects. It is occasionally given in snake-bite.

In Las Bela, the plant is used as a cure for pain in the limbs (Hughes-Buller).

No part of the plant is an antidote to snake-venom (Mhaskar and Caius).

Hindi: Chitiphul, Safedbhangra—; *Las Bela:* Saring—; *Punjab:* Gorakhpamo, Kharai, Safedbhangra, Tindu—.

4. **Heliotropium brevifolium** Wall. Cat. 914.—PLATE 652B (under *H. strigosum* var. *brevifolia*).

A much-branched undershrub. Leaves narrowly oblong-lanceolate, up to 1.5 cm. long, very white, strigose, hispid, the margins reflexed. Flower-spikes up to 7.5 cm. long. Nutlets ovoid, with minute grey hairs. Otherwise like *H. strigosum* Willd.

Distribution: Throughout India.

The plant is laxative and diuretic.

The juice is used as an application to sore eyes, gum boils, and sores generally, and as a cure for the sting of nettles and insects.

Hindi: Chitiphul, Safedbhangra—; *Punjab:* Gorakhpamo, Kharai, Tindu—.

5. **Heliotropium indicum** Linn. Sp. Pl. (1753) 130.—PLATE 651A.

A coarse somewhat succulent annual 15-60 cm. high, with stout stem and ascending branches more or less densely hirsute with spreading hairs. Leaves alternate or often subopposite, 4.5-10 by 2.5-5 cm., ovate or ovate-oblong, obtuse or subacute, usually with a few scattered hairs above, minutely pilose beneath, the margins much undulate or subserrate, base rounded or sometimes cordate or narrowed, often unequal-sided and then suddenly contracted and decurrent into the petiole; nerves and veins conspicuous on the lower side; petioles 2-3.8 cm. long, more or less winged. Flowers pale violet, numerous, sessile, 2-ranked, in simple or rarely forked usually extra-axillary bristly ebracteate spikes 5-15 cm. long. Calyx 2.5 mm. long, bristly with a few long hairs outside; segments 1.5 mm. long, linear-lanceolate, acute, unequal. Corolla 5 mm. long; tube 3 mm. long, hairy outside, narrowed upwards; limb infundibuliform; lobes about 0.5 mm. long, orbicular-oblong. Stamens inserted below the middle of the corolla-tube; filaments very short; anthers 0.5 mm. long, ovate, acute. Style 0.6 mm. long; stigma 0.4 mm. long, with an annular frill at the base and with a short obtuse apex. Fruit 4 mm. long,

deeply 2-lobed, each lobe compressed, bluntly 4-ribbed, produced above into a short blunt bidentate beak and containing 2 angular beaked hard 1-seeded pyrenes which have each an empty cavity on the inner side.

Distribution: Throughout India, Ceylon.—Malaya, tropical Africa and America.

The plant is bitter, astringent, heating; cures all intractable fevers (Ayurveda).

The leaves of this widely-distributed plant are held in esteem in various parts of the world as an external application to ulcers, wounds, and local inflammations. Their action is probably only that of an emollient. Diuretic properties are also assigned to the plant.

In Patna, the leaves are employed in cases of fever; the dose given being from half a drachm to three drachms.

In Cambodia, a decoction of the leaves and young shoots is taken for urticaria. The flowers are considered emmenagogue in small doses, abortifacient in higher doses. Externally plasters of the roots and leaves are applied to ringworm and for rheumatism.

The leaf is considered by the natives of Porto Rico to be an excellent remedy for all kinds of ulcers. But it has a far greater reputation for the cure of sore throat.

An infusion is used in venereal disease among the Mandingos.

In the Gold Coast, the plant is commonly used as an enema. The leaves are used to cure gonorrhœa, erysipelas, and also as a local application for boils, sores, and stings.

In Ashanti, the women boil the leaves and mix them with clay to stop abortion.

In Guiana, a decoction is applied as a lotion to yaws and atonic ulcers. An infusion of the flowers is taken for menorrhagia.

The juice of the fresh herb is useless as an external application in snake-bite (Mhaskar and Caius) and scorpion-sting (Caius and Mhaskar).

Aowin: Apumpumo—; *Ashanti:* Akormfairtikobo—; *Awuna:* Koklotortsu—; *Bengal:* Hatisura—; *Bombay:* Burundi—; *Cambodia:* Pramoi damrey—; *Central Provinces:* Chapputattu—; *French:* Crête de coq, Herbe de saint Fiacre—; *French Guiana:* Crête-coq, Herbe

ă malingres—; *Ga:* Gbekengbiiawor—; *Gambia:* Cock's comb—; *Gujerati:* Hastisundha—; *Hindi:* Hattajurie, Hattasura, Siriari—; *Languedoc:* Cresta de gallo—; *La Reunion:* Herbe aux papillons—; *Malay:* Jinkin Kala, Rumput oleh, Seri bumi—; *Marathi:* Bhurundi—; *Porto Rico:* Yerba de Cotona—; *Sanskrit:* Bhurundi, Hastishundi, Hatisunada, Srihastini—; *Sinhalese:* Dimibiya, Eksætiya, Ethonda, Etsetiya—; *Spanish:* Yerba de Borrajou, Yerba de Cotorra—; *Tagalog:* Cotingcotingan, Hilalayon, Himlalayon—; *Tamil:* Telkodduki, Telmani—; *Twi:* Akomfemkonakyi, Akorkortubatuba, Ansamkonakyi—; *Uriya:* Hatisura—; *Visayan:* Cabracabra, Cambracambra, Icogicogsangcuti, Trompalipautc—.

TRICHODESMA R. Br.

Erect herbs usually hispid. Leaves opposite or alternate, quite entire. Flowers in racemose terminal unilateral cymes simple or bifid, usually bracteate. Calyx deeply 5-lobed, enlarged in fruit, angled, winged, or auricled at the base; lobes imbricate. Corolla-tube broadly cylindric or 5-gonous, throat naked or slightly closed by the intrusion of the sinuses; lobes 5, shortly ovate or lanceolate, often long-acuminate, contorted, overlapping to the left. Stamens 5; filaments short, broad, and, as well as the connectives, usually hairy on the back; anthers linear-oblong, acuminate, erect, conniving. Ovary 4-lobed; ovules subhorizontal, attached to the inner angles of the cell; style subterminal, slender; stigma small. Fruit pyramidal; nutlets 4, broad, tuberculate or smooth, with or without a raised entire or pectinate or glochidiate margin, the lower face almost entirely adnate to the torus. Seeds suborbicular or obovoid; embryo straight or slightly curved; cotyledons plano-convex; radicle short.—Species 20.—Palæotropics.

A. Nutlets with or without a faint entire margin
  1. Calyx at flowering time cordate or hastate at the base .... 1. *T. indicum.*
  2. Calyx at flowering time rounded at the base .... 3. *T. zeylanicum.*
B. Nutlets with a raised white spiny margin on the inner edge
  Calyx at flowering time truncate at the base .... 2. *T. africanum.*

The genus is emollient.

1. **Trichodesma indicum** R. Br. Prodr. (1810) 496; Wight Ill. t. 172.—PLATE 653A.

Annual, erect, much-branched, very hispid, 15-45 cm. high. Leaves 3.8-10 by 0.6-5 cm., variable, sessile, ovate or oblong, or lanceolate-oblong, obtuse or subacute, clothed above with stiff hairs springing from white (when dry) circular tubercles, less harshly hairy and more or less densely villous beneath, cordate or hirsute at the base. Flowers pale violet-blue, solitary and leaf-opposed and in terminal few-flowered cymes; pedicels 6-13 mm. long, slender, nodding, hispid. Calyx 11-13 mm. long (including the auricles), deeply divided, hispid with long hairs; segments lanceolate, acute, cordate or hastate at the base, connate by the basal auricles. Corolla 1.3 cm. long; tube 6 mm. long; limb oblique, infundibuliform, thinly hairy inside; lobes 3-4 mm. long (not including the acumen which is sometimes short, sometimes very long), ovate-deltoid, suddenly acuminate. Cone of anthers large and very pointed, clothed on the back with dense white hairs; anthers included or exserted, with a few hairs at the base, inserted on the corolla-tube, the produced connectives linear, very acute, finally twisted together. Ovary ovoid, acute, tapering into the style, glabrous; style nearly 6 mm. long. Fruit pyramidal, subtruncate at the apex, tipped with the persistent style, 4-ribbed; nutlets 5 mm. long, ovoid, smooth and polished on the back, rugose on the inner face, not or scarcely margined, bluish white or nearly white when fully ripe, leaving 5 deep ovate pits on the membranous axis when falling.

Distribution: Throughout the greater part of India in the plains, Baluchistan, Ceylon. —Afghanistan, Persia, Mauritius.

The plant is beneficial in diseases of the eye; it helps in the expulsion of the dead fœtus (Ayurveda).

It is held in repute in snake-bites; also considered diuretic. A cold infusion of the leaves is considered depurative. In the Deccan, the plant is used as an emollient poultice.

In Chota Nagpur, the root pounded and made into a paste, is applied to reduce swellings, particularly of the joints.

Among the Mundas the root reduced to powder is rubbed over

swellings and along the border of healing sores. Pounded with water it is given as a drink to children with dysentery.

In Las Bela, the plant is considered as a cure for fever (Hughes-Buller).

The leaves are not an antidote to snake-venom (Mhaskar and Caius).

Bengal: Chotokulpa—; *Ceylon:* Kaviltumpai—; *Gujerati:* Undhaphuli—; *Hindi:* Andhahuli. Chhotakulpha, Hetamundiya, Ondhaphuli, Ratmundiya—; *Kashmir:* Nilakrai, Ratisurkh—; *Kumaon:* Ratmandi—; *La Reunion:* Bourrache sauvage, Petite herbe tourterelle—; *Las Bela:* Gaozaban—; *Marathi:* Chhotaphulya, Lahanakalpa, Pathari—; *Mundari:* Kulatirub, Tarakiba, Tirubsing—; *Punjab:* Andusi, Kallributi, Nilakrai, Ratmandu—; *Sanskrit:* Adhapushpi, Adhomukha, Andhapushpi, Avakpushpi, Darvika, Dhenujivha, Gandhapushpika, Golomi, Romalu, Surasa—; *Santal:* Hetmudia—; *Sind:* Gaozaban—; *Tamil:* Kalhudaitumbai—; *Telugu:* Guvvagutti—.

2. **Trichodesma africanum** R. Br. Prodr. (1810) 496.—Plate 653B.

A branched herb 30-45 cm. high, densely clothed with very stiff sharp white prickly hairs springing from bulbous bases which are white when dry. Leaves opposite, 1.3-7.5 by 0.6-3.8 cm., ovate-oblong, acute, clothed like the stem with prickly hairs from bulbous bases, base usually acute; petioles of the lower leaves sometimes reaching 2.5 cm. long, the upper leaves sessile. Flowers in many-flowered panicles; pedicels 6-13 mm. long, filiform, densely clothed with long white hairs. Calyx clothed with stiff white hairs which are often 2 mm. long, truncate, not cordate nor hastate at the base when flowering, in fruit sometimes very slightly cordate; segments 6 mm. long at flowering time, lanceolate, acute. Corolla blue, with yellow throat and 5 purple spots; tube 2.5-3 mm. long, narrowly campanulate; lobes 5 mm. long (including a long acute apiculus), ovate-deltoid. Cone of the anthers about 6 mm. long, slightly pubescent on the back; anthers lanceolate, the produced connectives nearly as long as the cells, twisted together at the apex. Ovary ovoid, tapering into the style; style slender, rather more than 5 mm.

long, glabrous; stigma minute. Nutlets ovoid, 5 mm. long, rugose on the inner, smooth on the outer face, with a raised white spiny margin on the inner edge.

Distribution: Punjab, Sind, Baluchistan.—Afghanistan, Persia, Arabia, tropical and S. Africa.

The leaves are used as a diuretic and an emollient.

At Kharan, the plant is used as a drug for bad coughs (Hughes-Buller).

Hausa: Walkin tsofo, Walkin wawa—; *Kharan:* Charmaing—; *Sind:* Paburpanee—.

3. **Trichodesma zeylanicum** R. Br. Prodr. (1810) 496.—PLATE 654B.

Annual, erect 30-60 cm. high; stem stout, often purplish, and as well as the branches, clothed with long soft hairs. Leaves 5-10 by 1.3-2.5 cm., lanceolate-oblong, acute or subobtuse, densely clothed above with short stiff hairs from bulbous white bases, finely pubescent and with a few pustular hairs beneath, base usually narrowed; petioles 4-13 mm. long., often obscure or almost 0. Flowers light blue, numerous, usually in terminal bracteate paniculate cymes (occasionally a few solitary flowers in the upper axils); pedicels 1.3-2 cm. long, slender, hairy, nodding; bracts foliaceous. Calyx divided to the base or nearly so, clothed with soft appressed hairs, rounded at the base; segments 8 mm. long at flowering time, lanceolate, acute, with strong midrib, pubescent inside. Corolla-tube 5 mm. long, campanulate; lobes about 1.5 mm. long, somewhat obovate, rounded, plicate, with a sudden spirally twisted acumination 2.5 mm. long from a triangular base. Cone of the anthers 6 mm. long, densely hairy at the back; anthers lanceolate, hairy at the base, the produced linear acute connectives about as long as the cells and finally spirally twisted at the apex. Ovary ovoid, glabrous; style 6 mm. long, slender, glabrous; stigma minute. Nutlets 4-5 mm. long, broadly ovoid, subobtuse, faintly margined, the inner face slightly rugose, the back smooth and polished, grey when ripe.

Distribution: Gujarat, Konkan, Deccan, S. M. Country, all dry districts of Madras Presidency, Ceylon.—Malaya, Australia, Mascarene Islands.

The plant is alexipharmic; cures "kapha", "tridosha", leucoderma, piles (Ayurveda).

The leaves are used as an emollient and diuretic.

Hindi: Dhadhona, Hetemuria, Jalasirasa—; *La Reunion:* Bourrache sauvage, Herbe tourterelle—; *Marathi:* Jalashirasi—; *Mundari:* Tirupsing—; *Philippines:* Olongain—; *Sanskrit:* Ambusirishika, Dhindhinika, Durbala, Jhingi, Jhingini, Sirishika—; *Tagalog:* Mabulo—.

Cynoglossum Linn.

Perennial or biennial erect hairy herbs. Leaves alternate, the radical often with long petioles. Flowers in usually elongate, generally ebracteate, sparingly branched or loosely paniculate racemes, bluish or purple, ultimately distant, pedicelled or subsessile. Calyx 5-partite, scarcely enlarged in fruit, patent or reflexed. Corolla distinctly veined; tube short, the throat closed with obtuse or arched scales; lobes 5, imbricate, obtuse, patent. Stamens 5, inserted on the corolla-tube, included beneath the scales; filaments short; anthers ovoid or shortly oblong, obtuse. Ovary with 4 distinct lobes from an almost flat receptacle; ovules horizontal, attached to the inner angle of the cell; style short or long, usually persistent, rigid and sometimes split to the base into laciniæ deciduous with the nutlets. Fruit a depressed pyramid formed of 4 nutlets adnate by their inner halves to a linear carpophore with a shortly conic base, the nutlets rather convex or flat on the dorsal side with or without an elevated margin, scarcely produced at the apex, the base rounded or almost saccate, produced downwards. Seeds straight or slightly curved; cotyledons wide, flat; radicle short.—Species 50.—Temperate and subtropical regions.

The leaves are emollient; the root narcotic and pectoral.

C. officinale Linn. and *C. pictum* Ait. are used medicinally in Europe; *C. enerve* Turcz. is used in South Africa.

Official :—The root bark of *C. officinale* Linn. in France and Spain.

The root of *C. officinale* Brot. non Linn. (*C. clandestinum* Desfont.) in Portugal.

1. **Cynoglossum glochidiatum** Wall. Cat. (1828) no. 922.
Erect, 30-60 cm.; stem hispid with hairs springing from tubercles; branches ascending. Leaves 5 by 1.3 cm., thin, sparsely hispid on both surfaces with hairs often rising from tubercles; cauline leaves lanceolate, base attenuate or petioled, ciliate or denticulate; radical leaves 0 at the time of flowering. Calyx-lobes ovate obtuse, sometimes oblong and 2 mm. in fruit. Nutlets 2.5 mm., margined by the confluent bases of the glochidia, but not prominently, glochidia on the faces plentiful and not much shorter; carpophore sublinear.

Distribution: Kashmir, Sikkim, Assam, W. Peninsula.—Afghanistan, Central Asia.

In Lakhimpur, the juice of the root is given to stop the vomiting of infants (Carter).
Assam: Dhalabrauisabta—.

Macrotomia DC.

Erect, hispid, perennial herbs. Leaves alternate, oblong or linear. Spikes dense, or in fruit elongate. Sepals 5, linear, long, more or less accrescent in fruit. Corolla (in the Indian species); tube narrow, long; throat naked; lobes 5, imbricate in bud, round, spreading. Stamens 5; anthers oblong, obtuse, in the throat of the corolla, with the stigma in the middle of the tube; or anthers in the middle of the corolla-tube with the stigma at the mouth. Ovary deeply 4-lobed; style filiform, 2-fid with 2 capitate stigmas, or entire with a 2-lobed stigma. Nutlets 4, ovoid, rugose, trigonous; scar basal, large, flat.—Species 8.—Mediterranean to Himalaya.

1. Leaves narrow, lanceolate .... 1. *M. benthami.*
2. Leaves oblong .... 2. *M. perennis.*

The genus is not therapeutically defined.

1. **Macrotomia benthami** Dc. Prodr. X, 26.—Plate 655B.
Erect, hispid, perennial herbs, tall, simple, stem 0.3-0.9 m. Radical leaves 28 by 1.3 cm.; cauline leaves 7.5 by 1.3 cm.; acute;

all narrow lanceolate. Spike terminal, solitary, 30 by 5-7.5 cm., usually very dense. Flowers purple; sepals 2.5-3.8 cm., linear. Corolla-tube 1.7 cm., mouth 6-8 mm. diam. Style shortly bifid; stigmas 2, capitate. Nutlets 4 mm., ovoid, suddenly acute, nearly as broad as long.

Distribution: Western Himalaya, from Kashmir to Kumaon, 10,000—13,000 ft.—Afghanistan.

The plant is considered useful in diseases of the tongue and throat (Stewart).

Punjab: Gaozaban—.

2. **Macrotomia perennis** Boiss. Fl. Or. IV (1879) 212.—PLATE 655A.

Root perennial; stems 20-50 cm., solitary or several, undivided, hirsute. Leaves oblong, radical ones 12.5 by 0.8 cm., striated; cauline 2.5-5 cm., sessile. Cymes 7.5-10 cm. diam., compound, spikes short, many-flowered or subcapitate; pedicels 0-8 mm. Sepals 8-13 mm. in flower, patently hirsute, in fruit sometimes nearly 2.5 cm. and sublanceolate. Corolla-tube as long as the sepals in flower or exceeding them by 2.5-5 mm.; lobes 4 mm. varying in breadth. The flowers are dimorphic, one form having ½-exserted anthers and short 2-lobed stigmas, the other with included anthers between the capitate stigma. Nutlets resembling those of *M. Benthami,* but larger.

Distribution: Alpine W. Himalaya from Kashmir to Kumaon, 10,000—14,000 ft.—Afghanistan, Yarkand, Alatau Mts.

The bruised roots of this plant are applied to eruptions, and, along with *Onosma echioides* and one or two other roots, constitutes the *Ruttanjot* of the Punjab and the North-West Himalayas. In Afghanistan, it is used to relieve tooth-ache and ear-ache.

ONOSMA Linn.

Hispid herbs or undershrubs. Leaves alternate. Racemes simple or cymose, 1-sided, bracteate. Flowers yellow or purple, sessile or shortly pedicelled. Calyx 5-partite or 5-fid; segments acute, in fruit sometimes enlarged. Corolla tubular or ventricose,

throat dilated or contracted; lobes 5, very short. Stamens 5, filaments attached near the middle of the corolla-tube linear short or long or greatly dilated at the base; anthers lanceolate, acuminate, free, conically connivent, included or ½-exserted. Ovary deeply 4-lobed; style filiform, stigma capitate or obscurely 2-lobed. Nutlets 4, ovoid, acute, erect or somewhat incurved, smooth or tuberculate; scar basal, large, flat.—Species 80.—Mediterranean, Himalaya.

1. Leaves oblong .... 1. *O. echioides.*
2. Leaves lanceolate, upper ovate-lanceolate .... 2. *O. bracteatum.*

Refrigerant and demulcent properties are to be found in this genus.

O. echioides Linn. is used medicinally in Spain.

1. **Onosma echioides** Linn. Sp. Pl. ed. 2, 196.—PLATE 656A.

A biennial, patently hispid, herb. Stem 20-50 cm. Cauline leaves 6.3 by 1.3 cm. oblong. Racemes elongate, often forked, in fruit 2.5-15 cm., bracts 1.3-2.5 cm., leaf-like; pedicels 0-1.3 cm. Calyx-lobes 8 mm., narrowly oblong, in fruit sometimes attaining 2.5 cm., much longer than the tube. Corolla 2 cm. cylindric, tube somewhat dilated upward, yellow, 6 mm. diam. at top, glabrous without. Filaments linear, anthers included, or shortly exserted. Style overtopping the anthers. Nutless 5-6 mm. long, stony, white, shining smooth, often speckled.

Distribution: Kashmir, 5,000—9,000 ft., Kumaon, Baluchistan.—From Siberia and Afghanistan to Europe.

The plant has a bitter, sharp taste; cooling, laxative, anthelmintic, alexipharmic; good in diseases of the eye, derangements of the blood, bronchitis, abdominal pain, strangury, thirst, itch, leucoderma, fevers, wounds, piles, urinary calculi (Ayurveda).

The bruised root is used as an application to eruptions. The leaves possess alterative properties, and the flowers are prescribed as a cordial and stimulant in rheumatism and palpitations of the heart.

In Spain, the plant, and more particularly the root, is considered emollient, cooling, and diuretic.

In the Harboi Hills, the powdered leaves are given to children as a purgative (Hughes-Buller).

Catalan: Onosma bovina, Onosma de bou—; *French:* Cerinthe, Melinet—; *Harboi Hills:* Yarling—; *Hindi:* Ratanjot—; *Italian:* Cerinta—; *Nepal:* Newarmaharangi—; *Pishin:* Yarilang—; *Punjab:* Koame, Laljari, Maharanga, Ratanjot—; *Sanskrit:* Adhanani, Anjanakeshi, Dhamani, Kapotabana, Kapotacharana, Kapotanghri, Nali, Nalika, Nalini, Narttaki, Nati, Nirmadhya, Raktadala, Shushira, Stutya, Vidrumalata—; *Spanish:* Onosma—.

2. **Onosma bracteatum** Wall. in Roxb. Fl. Ind. ed. Carey & Wall. II, 13.—PLATE 656B.

Hirsute herbs. Stems 38 cm., erect, stout, patently hispid. Radical leaves 15 by 2.5 cm., petioled; cauline 5 by 1.7 cm., acuminate, upper surface hispid, with tubercular based hairs; lower leaves lanceolate, upper ovate-lanceolate, silky white beneath. Racemes capitate. Flowers in dense silky heads 5-7.5 cm. diam. Calyx-lobes in fruit 2.5 cm., linear silky. Corolla-tube 1.3 cm. long, 4 mm. diam. at the mouth, hairy without, ring of hairs at the base within. Anthers included, filaments linear. Nutlets ovoid rough, 4 mm., acute.

Distribution: Kashmir, Kumaon at 11,500 ft.

The leaves, flowers, and seeds are acrid; cooling, antipyretic, astringent to the bowels, diuretic, aphrodisiac, tonic; useful in bronchitis, diseases of the chest and lungs, asthma, throat troubles, ophthalmia, stomatitis, gingivitis, insanity, gonorrhœa, lumbago, leprosy; allay thirst (Yunani).

It is esteemed by the native practitioners as tonic and alterative, and is much prescribed as a decoction in rheumatism, syphilis and leprosy.

It is a good refrigerant and demulcent, few medicines are equal to it for relieving the excessive thirst and restlessness in febrile excitement. It is also of great service in relieving functional palpitation of the heart, irritation of the stomach and bladder, and strangury. It is used in the form of an infusion prepared with either cold or hot water.

Arabic: Taharatulsanulshur, Lasanulshur—; *Bengal:* Gaozaban—; *Hindi:* Shankhahuli—; *Persian:* Gaozaban—; *Urdu:* Gaozaban—.

CACCINIA Savi.

Very strigose herbs. Calyx 5-fid, beyond the middle, when in fruit stellately patent, corolla hypocrateriform with a narrow tube surpassing the calyx, at the throat abruptly widened, inside closed by little obtuse scales, segments patent, subunequal linear or oblong, stamens inserted at the apex of the tube; anthers exserted, anterior and lateral ones smaller unequal subsessile, the posterior one larger, longer exserted; style filiform, long-exserted. Fertile nutlets 2 or 1, compressed ovate or orbicular, horizontally subpendular..—Species 7.—W. and Central Asia.

The genus is not therapeutically defined.

1. **Caccinia glauca** Savi Cos. Bot. 1, t. 1.

Perennial, glaucescent, fleshy; flowering stem small, branching at the base, paniculate; fruiting stem angular; branches elongate lax fruit-bearing below only, the upper part bearing sterile bracts. Leaves oblong and oblong-lanceolate, on the margin and on the upper side provided with white conical spines which are tubercular at the base; bracts broadly lanceolate; flowering-calyx split into narrowly linear strigose segments, fruiting-calyx much widened, stellately patent, lobes broadly and shortly triangular; corolla bluish, tube one-and-a-half times or twice as long as the calyx, segments elliptic-linear, acute, anthers getting gradually smaller from the largest posterior one to the anterior ones. Nutlets ovate grossly and often obsoletely rugose, on the margin very shortly triangular-denticulate.

Distribution: Persia, Baluchistan.

The plant is alterative, tonic, diuretic, demulcent; it is used in syphilis and rheumatism.

LITHOSPERMUM Linn.

Herbs or undershrubs, hispid or rough. Leaves alternate. Flowers white blue or yellow, axillary solitary or in terminal bracteate racemes. Sepals 5, linear. Corolla tubular-funnel-shaped, throat naked or with 5 small scales; lobes 5, imbricate in bud, obtuse,

spreading. Stamens 5, included; anthers oblong, obtuse or apiculate. Ovary deeply 4-lobed; style filiform or cylindric, stigma usually 2-fid. Nutlets 4, erect, ovoid, stony, smooth or rough; scar flat, basal; receptacle nearly flat.—Species 50.—Temperate regions.

1. Leaves oblong-lanceolate .... 1. *L. officinale.*
2. Leaves lanceolate, lower petioled, obovate-oblong .... 2. *L. arvense.*

L. arvense Linn., *L. fruticosum* Linn., *L. officinale* Linn. are used medicinally in Europe; *L. officinale* Linn. var. *erythrorhizon* Clarke in China.

Cynoglossine, an alkaloid with a curare-like action, has been isolated from *L. arvense* Linn.

1. **Lithospermum officinale** Linn. Sp. Pl. (1753) 132; Engl. Bot. t. 134.

Perennial, hispidly hairy. Stems 60-120 cm., erect, corymbose upwards. Leaves 5 by 1.3 cm., oblong-lanceolate, rough, strigose, nerves subprominent. Racemes in fruit 2.5-10 cm.; pedicels 3 mm.; bracts leaf-like, smaller upwards. Corolla 6 mm., white, fading yellowish, hairy upwards. Nutlets 3 mm., ovoid, shining, white, smooth; sepals in fruit 6 mm.

Distribution: Kashmir.

The seeds are a popular diuretic and lithotriptic in Europe.

In Spain, an infusion of the leaves is used as a sedative.

Catalan: Mill bort—; *English:* Gromwell—; *French:* Blé d'amour, Graine d'amour, Graine perlée, Grémil, Grémil des champs, Grémil officinal, Herbe aux perles, Larmil des champs, Larmille des champs, Millet d'amour, Millet gris, Millet perlé, Millet du soleil, Nivelle sauvage, Perlière—; *German:* Ackerhirse, Bauernschminkwurz, Brein, Marientraenen, Meerhirse, Mirhirsch, Perlhirse, Perlkraut, Sonnenhirse, Steinhirse, Steinsamen—; *Italian:* Litosperma, Migliarino, Migliàsole—; *Roumanian:* Meiu pasaresc—; *Russian:* Varabeinik, Varabyinoye syemia—; *Spanish:* Granos de amor, Mijo de Sol—.

1. **Lithospermum arvense** Linn. Sp. Pl. 132.

An annual plant, 20-40 cm. high, or somewhat more, appressed-strigulose, green; stems branching from the base, erect or decumbent. Leaves obovate to oblong, oblong-lanceolate, and linear, the lower tapering to a petiole. Fruiting pedicels little thickened; corolla white, rarely bluish; nutlets pitted, acutely tubercled.

Distribution: Kashmir.—W. Tibet, Siberia to N. Africa, Europe.

In Spain, an infusion of the leaves is used as a sedative.

Catalan: Mill del sol petit—; *German:* Ackersteinsamen—; *Spanish:* Mijo del sol agreste—; *Switzerland:* Grémil, Herbe aux perles—.

CONVOLVULACEAE.

Herbs or shrubs often twining (rarely trees). Leaves alternate, petiolate, usually exstipulate (0 in CUSCUTA). Flowers regular, usually hermaphrodite, various in size and colour, often showy, solitary or in pedunculate axillary bracteate cymes. Calyx free, often persistent, 5-partite; segments equal or unequal, usually distinct to the base, sometimes accrescent. Corolla campanulate, infundibuliform or rotate, often plicate in bud, entire or shortly lobed. Stamens 5, inserted in the corolla-tube opposite the sepals; anthers 2-celled, dorsifixed, linear or oblong, dehiscing longitudinally. Ovary superior, 1-4-celled, rarely with almost distinct carpels; ovules 2, less commonly 1 or 4 in each cell; style filiform, simple or forked; stigma capitate, 2-lobed or stigmas 2. Fruit capsular or indehiscent, or circumscissile or irregularly breaking up. Seeds as many as the ovules or fewer; albumen scanty or 0; cotyledons usually broad and much folded (obscure or 0 in CUSCUTA).—Genera 50. Species 1000. —Tropic and temperate regions.

A. Corolla-tube usually uniformly enlarged from base to apex, the 5 bands rarely clearly defined from the intervening spaces. Pollen not echinulate

I. Yellow parasitic leafless twining herbs .... CUSCUTA.

II. Green non-parasitic leafy herbs or shrubs
  a. Fruit indehiscent. Style absent .... ERYCIBE.
  b. Fruit dehiscent or if indehiscent small with thin fragile walls
    1. Capsule not sessile in the middle of a large bract
      o. Corolla-lobes imbricate. Flowers axillary, solitary. Styles 2, quite free. Stamens exserted .... CRESSA.
      oo. Corolla-lobes induplicate-contorted. Flowers cymose. Stamens not exserted
        Capsule 4-valved. Styles free, each 2-branched. Stigmas on inner face of style-arms .... EVOLVULUS.
          *Stigmas elongate
            Stems erect or prostrate, rarely twining. Stigmas oblong or linear. Capsule 4-valved .... CONVOLVULUS.
      **Stigmas globose
        α. Capsule 4-valved. Stems not winged .... MERREMIA.
        β. Capsule operculately dehiscent. Stems winged .. OPERCULINA.

B. Corolla-tube not uniformly enlarged from base to apex, the 5 bands on the lobes clearly defined by 2 prominent lines. Pollen echinulate
  I. Fruit dehiscent or if indehiscent then with thin fragile walls
    a. Corolla more or less campanulate. Sepals never aristate. Stamens not exserted .... IPOMOEA.
    b. Corolla salver-shaped with rather swollen tube, red, yellow or white. Slender herbs, never muricate .... QUAMOCLIT.
    c. Corolla more or less hypocrateriform. Sepals usually aristate. Stamens exserted .... CALONYCTION.
  II. Fruit indehiscent, woody, mealy or fleshy
    a. Fruit woody. Corolla hypocrateriform. Stigmas elliptic-oblong .... RIVEA.
    b. Fruit mealy or fleshy. Corolla not or very rarely hypocrateriform. Stigmas globose
      1. Ovary 4-celled .... ARGYREIA.
      2. Ovary 2-celled .... LETTSOMIA.

Most of the members have an acrid taste, and exude a milky fluid when bruised. Taken internally they act as purgatives. The leaves are in some cases emollient.

The properties are due to resins—orizabin—or glucosides—concolvulin, jalapin, scammonin—, which are all more or less toxic.

OFFICIAL:—*Convolvulus Scammonea* Linn. (Portugal); *C. Scammonia* Linn. (Belgium, France, Italy, Spain); *C. scammonium* Linn. (Switzerland, Turkey); *C. Turpethum* Linn.=*Ipomoea Turpethum* R. Brown (Portugal).

Cuscuta umbellata Humb., *C. racemosa* Mart. (Portugal).

Exogonium Jalapa (Nuttall & Coxe) Baillon (Russia, United States); *E. Purga* Benth. (Austria, Belgium, Denmark, France, Hungary, Japan, Norway, Sweden),—(Wenderoth) Bentham (Germany, Turkey)=*Ipomoea Purga* Hayne (Portugal, Switzerland) =*Ipomoea Purga* Weuder (Spain).

Ipomoea orizabensis (Pellet) Ledanois (Great Britain),—Ledenois (United States); *I. Purga* Hayne (Great Britain, Holland) =*Convolvulus Purga* Wend., *Exogonium Purga* Lindley (Italy); *I. Turpethum* R. Br. (France, Great Britain)=*Convolvulus Turpethum* Linn. (Spain).

Piptostegia Gomesii Mart (*Convolvulus operculatus* Gomes or *C contortus* Velloso), and *P. Pisonis* Mart. (*Operculina Turpethum* Manso) in Portugal.

ERYCIBE Roxb.

Scandent or rambling shrubs (rarely trees). Leaves alternate, entire, coriaceous. Flowers small, in axillary or terminal racemes or panicles; bracts small, lanceolate. Sepals subequal, orbicular, coriaceous, appressed to the base of the fruit. Corolla white or yellowish; tube shortly campanulate, hairy outside; limb plaited in bud; lobes 5, imbricate, each lobe deeply cut into 2 induplicate plaited segments, so that the limb appears 10-lobed. Stamens 5, subincluded, inserted on the corolla-throat; filaments short; anthers ovate-lanceolate. Ovary 1-celled; ovules 4; style 0; stigma large, subglobose or conic, 5- or 10- ridged. Fruit a berry, ovoid or ellipsoid. Seed solitary, glabrous; albumen scanty, intruded between the folds of fleshy cotyledons; radicle inferior.—Species 18. Indo-Malaya.

The genus is therapeutically inert.

1. **Erycibe paniculata** Roxb. Corom. Pl. II (1798) 31, t. 159; Wight Ill. t. 180.—PLATE 654A.

A large scandent shrub; branches long, flexuose, more or less angular, covered when young with reddish brown tomentum. Leaves 7.5-12.5 by 3.8-6.3 cm., elliptic-oblong or obovate-oblong, suddenly acuminate, glabrous or nearly so, base acute; main nerves arcuate,

4-6 pairs; petioles 6-13 mm. long. Flowers numerous, yellow, in terminal (less commonly axillary) panicles often reaching 15 or 18 cm. long, densely clothed with reddish brown tomentum; buds globose; pedicels 3-4 mm. long. Calyx divided to the base, covered outside with dense reddish brown, more or less stellate pubescence; sepals 3 mm. long, orbicular, strongly ciliate. Corolla 8 mm. long, 1.3 cm. or more across when expanded; tube 4 mm. long, broadly infundibuliform; lobes 5, fleshy or leathery, each deeply divided at the apex into 2 obtuse lobules, hairy on the back below the division with reddish brown hairs, the margins plaited and slightly sinuate. Stamens inserted near the base of the corolla-tube; filaments short, broad at the base, flattened; anthers with a long curved apiculation. Berry about 1.3 cm. long, ellipsoid, supported on the persistent sepals, black and pulpy when ripe.

Distribution: Throughout India, Ceylon, Nicobars.

In Chota Nagpur, the bark is given for cholera (Campbell).

Canarese: Ankole, Krimighna, Sengarballi—; *Hasada:* Urmered—; *Kolami:* Urumin—; *Malayalam:* Irimpiyatali—; *Naguri:* Karinari, Urmuring, Ururing—; *Sadani:* Kari—; *Santal:* Kari—; *Sinhalese:* Attameeriya, Etambiriya, Etamiriya—; *Tamil:* Unankodi—; *Telugu:* Puttapalatige—; *Uriya:* Bodolombomano, Katoporakhia, Madhobi—; *Visayan:* Saladay—.

RIVEA Choisy.

Climbing shrubs. Leaves cordate, usually silky beneath (at least when young); petiole long. Peduncles axillary, 1-3- (sometimes 7-) flowered; bracts 2-3, narrow. Sepals 5, ovate or lanceolate-oblong, subequal. Corolla large, hypocrateriform; tube narrow, cylindric; lobes of the limb broad, rounded, plicate. Disk annular. Stamens 5, included; anthers narrow, oblong, not finally twisting. Ovary 4-celled; ovules 4; style filiform; stigmas 2, linear-oblong. Fruit a subglobose dry woody berry, or an irregularly opening capsule often 1-celled from the absorption of the septa. Seeds 1-4, glabrous, surrounded by mealy pulp.—Species 12.—Indo-Malaya, S. America.

The genus is therapeutically inert.

1. **Rivea ornata** Choisy Convolv. Orient. in Mém. Soc. Phys. Genève VI (1834) 409; Wight Ic. t. 1356.—PLATE 657.

Climbing; stems stout, terete, finely silky-pubescent (especially when young) with white appressed hairs. Leaves 3.8-10 cm. long, usually broader than long, orbicular or reniform, obtuse, often apiculate or very shortly acuminate, glabrous above, more or less densely white-silky beneath, base cordate; petioles 2.5-7.5 cm. long, densely silky. Peduncles stout, stiff, 2.5-7.5 cm. white-silky, 1-7-flowered; bracts oblong, acute, fleshy, caducous; buds pointed, silky at the tip; pedicels short, stout, silky, articulated to the peduncle. Sepals 1.6-2 cm. long, ovate-lanceolate, acute or subacute, fleshy, silky-pubescent outside, persistent. Corolla at first white, afterwards becoming cream-coloured, drying yellow, sweetly fragrant; tube 3.8-5 cm. long; limb 5-6.3 cm. diam.; lobes shallow, emarginate. Fruit subglobose, less than 2.5 cm. diam. mucronate by the style-base, glabrous polished, brown.

Distribution: Konkan, Deccan, Carnatic, Ceylon.

The plant is acrid, pungent, sweetish; oleagenous, cooling, tonic; causes "kapha"; cures "vata", biliousness, diseases of the heart, bronchitis, effects of fatigue (Ayurveda).

In the Konkan, the juice enters into the composition of an ointment for phthiriasis, and a preparation to be applied to piles.

Gujerati: Phangya—; *Hasada:* Baisjamburunari, Bhaisjamburunari—; *Marathi:* Phand, Phanji—; *Naguri:* Tonangutuara—; *Sanskrit:* Aparajita, Ajantsi, Ajara, Jirna, Jirnadaru, Padma, Phanji, Phanjika, Sukshmapatra, Supushpika—; *Tamil:* Muchuttai, Musuttai—; *Telugu:* Bodditige—.

ARGYREIA Lour.

Climbing rarely suberect shrubs. Leaves ovate-cordate to narrow-lanceolate, usually pubescent or silky beneath. Flowers showy, purple or rose (rarely white), usually in many-flowered cymes, often capitate; bracts often conspicuous. Sepals 5, herbaceous,

leathery and but little enlarged in fruit, often red within. Corolla infundibuliform or somewhat tubular; limb plicate, more or less hirsute externally, shortly lobed. Stamens 5, included; anthers oblong, straight. Disk annular. Ovary 4-celled; ovules 4; style filiform; stigma 2-globose. Fruit a dry hard berry. Seeds 4 or fewer, embedded in mealy pulp.—Species 40.—Tropical Asia, Africa.

1. Leaves ovate-acute .... *A. speciosa.*
2. Leaves acuminate, elliptic-acute .... 2. *A. fulgens.*

The genus is therapeutically inert.

1. **Argyreia speciosa** Sweet Hort. Brit. ed. 1 (1827) 289; Wight Ic. t. 851.—PLATE 658.

A very large climber; stems stout, white-tomentose. Leaves 7.5-30 by 6.3-25 cm. (sometimes even larger), ovate, acute, glabrous above, persistently white-tomentose beneath, base cordate; petioles 5-15 cm. long, white-tomentose. Flowers in subcapitate cymes; peduncles 7.5-15 cm. long, stout, white-tomentose; bracts large, ovate-lanceolate with a long acumen, thin, veined, pubescent outside, glabrous inside, deciduous, the outer sometimes 5 cm. long; pedicels very short, often almost 0, white-tomentose. Calyx white-tomentose outside; sepals nearly 1.7 cm. long, oblong-elliptic, obtuse. Corolla 5-6.3 cm. long, tubular-infundibuliform, the bands silky pubescent outside; tube somewhat inflated, white-pubescent outside, rose purple and glabrous inside. Ovary glabrous. Fruit 2 cm. diam., globose, apiculate.

Distribution: Perhaps a native of Bengal; throughout India, often cultivated.—Java.

The root is bitter; aphrodisiac, diuretic; used in gleet, gonorrhœa, strangury, chronic ulcers (Yunani).

In Hindoo medicine, the root is regarded as alterative tonic and useful in rheumatic affections and diseases of the nervous system.

The leaves are maturative and absorptive, and are used as emollient poultices for wounds, and externally in skin diseases. In synovitis, the powdered root is given with milk. Mixed with vinegar, the sap is rubbed over the body to reduce obesity.

The leaves are used as a local stimulant and rubefacient.

In Lakhimpur, the tuber in the form of a paste is applied externally in abscess of the stomach (Carter).

Bengal: Bichtarak, Guguli—; *Bombay:* Guguli, Samudrashoka—; *Canarese:* Samudraballi, Samudrahalaballi, Samudrasoge—; *Deccan:* Samandarkapatta—; *English:* Elephant Creeper—; *Hasada:* Harluara—; *Gujerati:* Samudrasosh, Vargharo—; *Hindi:* Samandarkapat, Samandarphaind, Samandarsof, Samandarsokh, Samudrasokh—; *La Reunion:* Liane d'argent—; *Malayalam:* Samudrapachcha, Samudrapala, Samudrastokam, Samudrayogam—; *Marathi:* Samandarshokh, Samudrasoka, Samudrasokh—; *Mundari:* Marangharlu—; *Naguri:* Haruara—; *Porebunder:* Samodarasosh, Samudrasosh—; *Sanskrit:* Ajantri, Antakotarapushpi, Chhagaladi, Chhagalanghhri, Chhagantri, Chhagala, Dirgha, Driddhadaraka, Driddhadaru, Hastivalli, Rykshagandhha, Samudrapalaka, Samudrapatra, Samudrasosha, Vryddhadaraka—; *Santal:* Kedokarak—; *Sinhalese:* Mahadumudu—; *Tamil:* Ambagar, Peymunnai, Sadarbalai, Samutrachogi, Samutrappachai, Samuttrappalai—; *Telugu:* Chandrapoda, Kokkita, Kokkiti, Palasamudra, Samudrapachcha, Samudrappala, Tivvakkokkita—; *Urdu:* Samandarsotha—; *Uriya:* Bryddhotareko, Monda—.

2. **Argyreia fulgens** Chois. Convol. Or. 33; Wight Ic. t. 1357.

Branches straight, silky white. Leaves 10 by 4.5 cm., acuminate, elliptic, acute, densely silky, shining beneath, base rounded or rhomboid, glabrate above; petioles 2.5-5 cm. Peduncles numerous, 2.5 cm., 3-7-flowered; bracts deciduous. Sepals 5 mm., elliptic, subobtuse. Corolla 5 cm. and upwards, tubular-campanulate, glabrous without, or when young strigose near the tip, appears to have been very dark in colour. Ovary 4-celled. Fruit not seen.

Distribution: Deccan Peninsula.

The leaves are antiphlogistic.

LETTSOMIA Roxb.

Climbing shrubs. Leaves alternate, rounded rhomboid or cordate at base. Flowers in axillary peduncled corymbose or

capitate cymes; bracts conspicuous. Calyx of 5 orbicular elliptic or oblong sepals, in fruit often thickened and enlarged. Corolla tubular funnel-shaped, usually pink, the limb plicate; lobes small. Stamens 5, included or exserted; filaments usually enlarged and villous at base; anthers oblong or linear; pollen-grains spinulose. Disk annular. Ovary 2-celled, 4-ovuled; Style filiform; stigma 2-globose. Fruit a dry indehiscent berry. Seeds 4 or fewer, embedded in mealy pulp.—Species 20.—Warm Asia.

The genus exhibits antiphlogistic properties.

1. **Lettsomia aggregata** Roxb. Hort. Beng. 13; Fl. Ind. I, 488; Wight Ic. t. 1359.—*L. mysorensis* C. B. Clarke in Hook. f. Fl. Brit. Ind. IV, 192.

A climbing white- or yellowish- tomentose shrub (sometimes procumbent or diffuse); stems softly tomentose. Leaves 5-11.3 by 4.5-10 cm., ovate, usually obtuse, glabrous above, white- or yellowish-tomentose or woolly beneath, base shallowly cordate; main nerves prominent beneath; petioles 2.5-5 cm. long, tomentose, grooved. Flowers in dense capitate cymes; peduncles shorter than the leaves, 0-6.3 cm. long, grooved, tomentose; bracts large, broad, orbicular-ovate, 8-13 mm. long, densely silky-tomentose outside, glabrous inside, subpersistent; pedicels short or 0. Sepals oblong-obtuse, 1 cm. long, densely silky-tomentose. Corolla pink, rather more than 13 mm. long, tubular-campanulate; tube glabrous, 6 mm. long; limb 8 mm. long, deeply divided below the middle into 5 oblong emarginate lobes, each lobe furnished at the back with a densely hairy band, the margins of the lobes beyond the bands tender. Stamens and style much exserted. Filaments densely hairy at the base, with short stout hairs. Fruit 6-8 mm. diam., smooth, red, surrounded by the enlarged, spreading, rather thick, concave sepals, which are hairy outside, glabrous, red and smooth within. Seeds greyish black, smooth.

Distribution: Deccan, Carnatic, W. Peninsula, Ceylon.

The leaves are made into a paste and applied externally in cough, and quinsy.

Canarese: Uganiballi, Uganihambu—; *Telugu:* Ettakuta—.

CALONYCTION Choisy.

Large herbaceous climbers; stems usually muricate. Leaves large, cordate, entire or angled. Flowers 1-5 in axillary cymes; bracts caducous. Sepals 5, herbaceous, smooth, usually aristate, subequal or the outer smaller. Corolla large, glabrous, white or rose purple, hypocrateriform; tube long, narrow, many times longer than the sepals; limb plicate. Stamens 5, exserted. Ovary 2-celled; ovules 4; style filiform; stigma 2-globose. Capsule 4-valved. Seeds 4, glabrous.—Species 5.—Tropical Asia, Africa and America.

1. Corolla pure white. Seeds yellow .... 1. *C. bona-nox.*
2. Corolla rose-purple. Seeds black .... 2. *C. muricatum.*

The genus is not therapeutically defined.

1. **Calonyction bona-nox** Bojer Hort. Maurit. 228.—PLATE 659B (under *Ipomœa bona-nox* Linn.).

A large glabrous twiner climbing to a great height; stems often muricate (sometimes almost prickly). Leaves large, 7.5-18 cm. long, broadly ovate, acuminate, entire, glabrous, thin, base deeply cordate with broad rounded basal lobes; petioles about as long as the leaves. Peduncles 5-15 cm. long, glabrous, 1-5-flowered; bracts caducous; pedicels usually short, stout. Sepals subequal in length, 1.3 cm. long, ovate, strongly mucronate, the 2 inner broader than the 3 outer. Corolla pure white, the bands sometimes greenish; tube 7.5-9 cm. long, narrow; limb 7.5-12.5 cm. diam. Anthers shortly exserted. Capsules ovoid-oblong, about 2.5 cm. long, narrowed upwards. Seeds irregularly trigonous, 1.3 cm. long, glabrous, polished, yellow.

Distribution: More or less throughout India, Ceylon, wild and cultivated.—All tropical countries.

The capsules and seeds, as well as the flowers, leaves and roots are included amongst the medicines supposed to have some merit as remedies against snake-bite.

All parts of the plant are equally useless in the antidotal treatment of snake-bite (Mhaskar and Caius).

Bengal: Dudhiakalmi, Dudiyakulmi, Ilalkalmi—; *Bombay:* Chandrakanta, Gulchandni, Somavala—; *Burma:* Nwaykazunaphyu,

Kœadnari—; *Persian:* Tukininil—; *Philippines:* Tunquin—; *Sinhalese:* Kalualanga—; *Tamil:* Kattutali—.

QUAMOCLIT Moench.

Annual twining glabrous herbs. Leaves cordate and angled or lobed, sometimes pinnately divided. Flowers axillary, in few-flowered cymes; bracts small. Calyx of 5 aristate sepals, subequal or the outer rather the smaller. Corolla salver-shaped, slightly irregular, the tube slender or slightly funnel-shaped, the limb spreading. Stamens 5, much exserted; filaments unequal. Ovary glabrous, 4-celled, with 4 ovules; style rather longer than the stamens; stigma 2-globose; pollen-grains spinulose. Fruit a 4-celled 1-valved capsule, the septa thin, persistent. Seeds 4, black, pubescent or glabrous.—Species 11.—Tropical America.

1. Leaves pinnate, segments numerous, linear, distant .... 1. *Q. pinnata.*
2. Leaves ovate, broadly cordate, acute or acuminate .... 2. *Q. coccinea.*
3. Leaves ovate in outline, pinnately divided into numerous linear distant segments .... 3. *Q. vulgaris.*

The root is sternutatory.

Q. coccinea Moench. and *Q. vulgaris* Chois. are used medicinally in Europe.

1. **Quamoclit pinnata** Bojer Hort. Maurit. 224.—*Ipomœa Quamoclit* Linn. Sp. PL. (1753) 227.—PLATE 661, right hand figure (under *Ipomœa Quamoclit*).

A slender glabrous twiner. Leaves 7.5-12.5 by 5-7.5 cm., pinnate; segments numerous, linear, distant. Peduncles few-flowered. Corolla middle-sized, crimson or white. Sepals elliptic. Corolla-tube narrow, long, mouth rather small. Ovary completely 4-celled, 4-ovuled. Capsule ovoid, smooth, 4-celled. Seeds nearly glabrous.

Distribution: Common throughout India, in gardens and as a denizen.—Native of tropical America.

The Hindus consider it to have cooling properties. The pounded leaves are applied to bleeding piles, while a preparation of the juice with hot ghi is administered internally. In Bombay, the leaves are used as a *lep* for carbuncles.

Bengal: Kamlata, Tarulata—; *Burma:* Myatlæni—; *Canarese:* Kamalate, Kempumallige—; *English:* Red Jasmine—; *Hindi:* Kamlata—; *Malayalam:* Suriyakanti—; *Marathi:* Vishnukrant—; *Mundari:* Aiubbanari—; *Philippines:* Agao, Malabocboc—; *Sanskrit:* Kamalata, Tarulata—; *Tagalog:* Agoho—; *Tamil:* Kembumalligai, Mayirmanikkam—; *Telugu:* Kasiratnamu, Suriyaratnamu—; *Uriya:* Kunjolota—; *Visayan:* Agoho—.

2. **Quamoclit coccinea** Mœnch. Meth (1795) 453.—*Ipomœa coccinea* Linn. Sp. Pl. (1753) 160.

A scandent, twining, slender vine reaching a length of several metres. Leaves ovate, broadly cordate, acute or acuminate, margins subentire or angled, or broadly 3-5-lobed, 6-12 cm. long. Cymes axillary, long-peduncled, few-flowered, the peduncles up to 15 cm. long. Flowers erect, red. Sepals 5, green, about 6 mm. long, obtuse, slenderly spurred from the apex. Corolla deep red, the tube slender, slightly enlarged upward, 2.5 cm. long, the limb spreading, about 2 cm. diam. Capsule subglobose or ovoid, about 6 mm. diam.

Distribution: Tropical America.—Cultivated in India.

The root is sternutatory.
Spanish: Melindre de monja—.

3. **Quamoclit vulgaris** Choisy in Mem. Soc. Phys. Genev. VI (1834) 434.

A slender, twining, glabrous vine reaching a height of 4 m. or more. Leaves ovate in outline, 4-7 cm. long, pinnately divided into numerous, linear, distant segments. Cymes axillary, few-flowered, the peduncles 4-9 cm. long. Flowers erect. Sepals green, about 5 mm. long, apiculate, elliptic. Corolla deep red, salver-shaped, the tube about 2 cm. long, slightly enlarged upward, the limb spreading, 1.5-2 cm. diam., distinctly 5-lobed. Capsule ovoid, 7-8 mm. long.

Distribution: Tropical America.—Cultivated in India.

The leaves are cooling, astringent; useful in bleeding piles, carbuncles, vomiting, diarrhœa; help in stabilising the gravid uterus (Ayurveda).

The powdered root is used in Spain as a sternutatory.

Bengal: Kamlata, Tarulata—; *Burma:* Myatlaœni—; *English:* Red Jasmine—; *Hindi:* Kamalata—; *Malayalam:* Churiakranti—; *Marathi:* Sitachekesa, Vishnukrant—; *Sanskrit:* Kamalata, Tarulata—; *Spanish:* Cundeamor—.

Ipomœa Linn.

Herbs (rarely shrubs) twining or prostrate, rarely erect or sub-erect. Leaves alternate, usually entire. Flowers usually large in axillary (rarely paniculate) cymes which are often reduced to a single flower. Sepals 5, equal or unequal, imbricate, often enlarged in fruit. Corolla campanulate or infundibuliform; limb plicate, slightly lobed; bands usually defined by 2 prominent lines. Stamens 5, usually included; filaments filiform or dilated below, often unequal; anthers straight or contorted; pollen echinulate. Ovary 2- (rarely 3- or 4-) celled; ovules 4 (rarely 6); style filiform; stigma capitate, entire or 2-3-globose (rarely stigmas 2-linear). Capsule 4-6-valved, rarely indehiscent. Seeds usually 4 or 6 (rarely solitary), glabrous, bearded, or uniformly velvety or woolly.—Species 400.—Tropical and warm temperate regions.

A. Ovary 2-celled
- I. Sepals green, herbaceous, usually hairy
  - a. Outer 2-3 sepals much larger than the inner, accrescent
    - Glabrescent. Sepals decurrent at base in fruit .... 2. *I. uniflora.*
  - b. Sepals equal or nearly so, scarcely accrescent
    - Flowers pink in bracteate heads
      - *Leaves entire. Heads sessile or subsessile. Flowers small .... 15. *I. hispida.*
      - **Leaves deeply lobed. Heads long-petioled, many-bracteate .... 5. *I. pes-tigridis.*
- II. Sepals dry, membranous or somewhat fleshy with scarious margins, not hairy (ciliate in *reniformis*).
  - a. Leaves not deeply palmately lobed or only 2-3-lobed
    - 1. Small plants, never widely scandent. Flowers under 2.5 cm. usually yellow or white
      - Leaves nearly or quite as broad as long
        - o. Stem creeping. Leaves reniform. Flowers 13-20 mm. Sepals ciliate .... 6. *I. reniformis.*
        - oo. Leaves ovate or suborbicular, cordate entire .... 7. *I. obscura.*

ooo. Leaves broadly ovate or suborbicular, acuminate, apiculate	10.	*I. campanulata.*
2. Flowers over 2.5 cm., rarely yellow		
*Peduncles 1-flowered, more rarely 2-3-flowered, often 2-bracteate, never widely scandent		
o. Aquatic. Leaves mostly narrow	9.	*I. reptans.*
oo. Littoral. Leaves orbicular, 2-lobed or emarginate	11.	*I. pes-caprae.*
**Peduncles usually several-many-flowered. Climbers Leaves cordate-ovate, 2.5-5 cm., sometimes sub-3-lobed. Flowers purple or white. Sepals ovate-oblong. Corolla glabrous	8.	*I. sepiaria.*
b. Leaves deeply 5-7-lobed or palmately compound		
1. Leaves pedate	14.	*I. dasysperma.*
2. Leaves very deeply palmately 7-partite	13.	*I. tuberosa.*
3. Leaves very variable, digitate or the upper sometimes pedate; lobes 3-7, linear-lanceolate, irregularly and acutely serrate	12.	*I. dissecta.*
B. Ovary 3-celled, ovules 6		
Leaves 3-lobed, hairy. Flowers blue or pink	1.	*I. hederacea.*
C. Ovary 4-celled, ovules 4		
I. Scandent. Leaves deeply palmately lobed	3.	*I. digitata.*
II. Prostrate. Leaves triangular or irregularly sharply lobed	4.	*I. batatas.*

The genus is chiefly known for its purging properties.

The following species are used medicinally in China—*I. batatas* Poir., *I. hederacea* Jacq., *I. reptans* (L.) Poir.—; in Annam—*I. hederacea* Jacq.—; in Cambodia—*I. pes-capræ* Sw., *I. reptans* (L). Poir.—; in Malaya—*I. batatas* Poir.—; in the Philippine Islands—*I. hederacea* Jacq., *I. pes-capræ* Sw.—; in the West Indies—*I. cathartica* Poir., *I. macrorhizos* Rœm. and Schult., *I. tuberosa* Linn.—; in North America—*I. fastigiata* Sweet., *I. tuberosa* Linn.—; in Mexico—*I. emetica* Chois., *I. mestitlanica* Chois., *I. orizabensis* Steud., *I. purga* Hayne, *I. simulans* Hanb., *I. stans* Cav.—; in Brazil—*I. batatas* Poir., *I. pes-capræ* Sw., *I. operculata* Mart.—; in Guiana—*I. digitata* Linn., *I. pes-capræ* Sw., *I. tuberosa* Linn., *I. viridis* Chois.—; in Madagascar—*I. pes-capræ* Sw.—; in Hausa—*I. pilosa* Sw.—; in the Gold Coast—*I. batatas* Poir., *I. digitata* Linn., *I. dissecta* Willd.—; in South Africa—*I. albivenia* G. Don., *I. crassipes* Hook., *I. ficifolia* Lindl., *I. palmata* Forsk., *I. purpurea* Roth.—.

Official :—The seeds of *I. hederacea* Jacq. in Great Britain.

The dried root of *I. orizabensis* Ledanois in Great Britain,—Ledenois in the United States.

The root of *I. Purga* Hayne (Great Britain, Holland)=*Convolvulus Purga* Wend., *Exogonium Purga* Lindley (Italy).

The root and rhizome of *I. Turpethum* R. Br. (France)=*Convolvulus Turpethum* Linn. (Spain).

The root and stem of *I. Turpethum* R. Br. in Great Britain.

1. **Ipomœa hederacea** Jacq. Collect. I (1786) 124.—PLATE 661, left hand figure.

An annual. Stems twining, sparsely retrorsely hairy. Leaves 5-12.5 cm. diam., ovate-cordate, more or less deeply 3-lobed; lobes ovate, acuminate, petioles 2.5-10 cm. long. Peduncles 1-5-flowered, usually shorter than the petioles; bracts 8 mm. linear, close to the calyx, pedicels 6 mm. long. Sepals 1.3-2.5 cm. long, subequal, narrowly linear upwards, more or less hirsute near the base. Corolla 3.8-5 cm. long, tubular-funnel-shaped, blue tinged with pink, or somewhat orange-coloured below, glabrous outside. Ovary 3-celled. Capsule 8 mm. diam., 3-celled, 6-ovuled, subglobose or ovoid, glabrous. Seeds 6 or 4, glabrous.

Distribution: Throughout India both cultivated and apparently wild, up to 6,000 ft. in the Himalaya.—Believed to be of American origin, found in all tropical and subtropical regions of the world.

The seeds are laxative, carminative; cure inflammations, abdominal diseases, fevers, headache, diseasses of the head, bronchitis (Ayurveda).

The seeds have a bitter bad taste; purgative, bechic, anthelmintic; useful in diseases of the liver and the spleen, pains in the joints, leucoderma, scabies, biliousness; dry the phlegm; remove bad humours from the body (Yunani).

Roxburgh was the first to make these seeds known to European physicians, and it may be said they now hold an important position as a useful and cheap substitute for jalap.

Annam: Bach suu, Day bim bim biec, Hac suu, Nhi suu, O suu—; *Arabic:* Habunnil—; *Bengal:* Kaladanah, Mirchai, Nilkalmi—; *Bombay:* Kaladanah, Mirchai—; *Ceylon:* Tali—; *Chinese:* Ch'ien

Niu Tzu—; *Deccan:* Kalizirki, Zirki—; *English:* Indian Jalap, Morning Glory—; *Gujerati:* Kaladana, Kalkumpan, Kalokumpo—; *Hindi:* Kaladanah, Mirchai—; *Kanara:* Ganribija—; *Kashmir:* Hubulnil—; *Marathi:* Nilpushpi, Nilyel—; *North-Western Provinces:* Baunra—; *Persian:* Tukminil—; *Punjab:* Bildi, Ishpecha, Ker, Kirpawa, Phaprusag—; *Sanskrit:* Krishnabija, Shyamabija, Shyamalabijaka—; *Sind:* Hubulnil—; *Tagalog:* Bulacan—; *Tamil:* Kakkattan, Kodikkakkattan, Sirikki—; *Telugu:* Jiriki, Kolli—; *Urdu:* Kaladanah—; *Uriya:* Kanikhondo—.

2. **Ipomœa uniflora** Roem. & Sch. Syst. IV, 247. (non Blume).

Stems slender, glabrous or slightly silky-pubescent, twining. Leaves 5-7.5 cm., lanceolate-oblong, acute at the base, obtuse or emarginate, mucronate at apex, entire, glabrous above, slightly hairy beneath, petiole 6-13 mm. Flowers solitary, on angular or slightly winged pubescent pedicels; bracts small, peduncle 2.5-3.8 cm. Sepals about 2 cm., nearly equal in length, apiculate, pubescent, the 2 outer enclosing the rest, oval, either cordate or decurrent at base, the 2 innermost linear. Corolla campanulate, limb 3.2 cm. diam., recurved. Capsule 1.7 cm., ovoid, glabrous, 4-valved. Seeds ovoid, dark brown, slightly pubescent, fringed with a ring of short scaly hairs round margin.

Distribution: Throughout India, Ceylon, Malay Peninsula.—Malaya to Fiji Islands, tropical Africa.

It is purgative, and the juice is administered in bilious dyspepsia.
Sinhalese: Potupala—.

3. **Ipomœa digitata** Linn. Syst. Nat. ed. X (1759) 924 (non Parodi).—Plate 662.

Perennial, with large ovoid or elongated tuberous roots; stems long, thick, twining, tough, glabrous. Leaves 10-15 cm. long, often broader than long, deeply palmately divided; lobes 5-7, ovate-lanceolate, acute or acuminate, glabrous, entire, pale and with prominent nerves beneath; petioles 5-12.5 cm. long, glabrous. Flowers in many-flowered corymbosely paniculate cymes; peduncles solitary,

axillary, sometimes exceeding 15 cm. long, stout; bracts minute, deciduous; pedicels 6-20 mm. long. Sepals 6-8 mm. long, orbicular-oblong, subobtuse, concave, glabrous. Corolla purple, 3.8-6.3 cm. long, campanulate-infundibuliform; lobes of the limb emarginate. Ovary 4-celled glabrous. Capsules ovoid, 8-13 mm. long, 4-celled, 4-valved, surrounded by the enlarged rather fleshy sepals. Seeds clothed with brownish cottony readily detachable hairs, nearly 6 mm. long.

Distribution: Throughout tropical India in moist regions, Ceylon. Tropical Asia, Africa, America, Australia in moist climates.

The root is sweet; cooling, indigestible; tonic, aphrodisiac, galactagogue, diuretic, stimulant, alterative; useful in leprosy, burning sensation, vomiting, diseases of the blood; improves the voice and the complexion; causes "kapha".—The flower is sweet; cooling, aphrodisiac; cures biliousness; causes "vata" and "kapha" (Ayurveda).

The root is sweetish bitter; heating and dry; carminative, expectorant, anthelmintic, stomachic, appetiser; useful in syphilis, gonorrhœa, and inflammations.—The leaves enrich the blood (Yunani).

The large tuberous roots are very much used in native medicine, being regarded as tonic, alterative, aphrodisiac, demulcent, and lactagogue. The powdered root-stock is given with wine, for the purpose of increasing secretion of milk.

The powdered root is used in spleen disease; it is purgative in its action. Cholagogue, useful in liver complaints.

The root enters into the composition of snake remedies (Charaka, Sushruta); but it is not an antidote to snake-venom (Mhaskar and Caius). Nor is it an antidote to scorpion-venom (Caius and Mhaskar), though recommended for use in the treatment of scorpion-sting (Sushruta).

Bengal: Bilaikand, Bhuikumra, Bhumikumra—; *Bombay:* Bhuikohala—; *Canarese:* Bhumichakragadde, Bujagumbala, Guddagenasu, Nelagumbala, Vidari—; *English:* Giant Potato—; *French Guiana:* Patate sauvage—; *Hindi:* Bilaikand—; *Malay:* Kank kong

laut, Kaledek hutan—; *Malayalam:* Mutalakkanta, Palmutakku—; *Marathi:* Bhuikohola, Vidarikand—; *Sanskrit:* Bhukshmandi, Bhumikushmanda, Gandhaphala, Gajavajipriya, Gajeshta, Ikshugandha, Kshirakhanda, Kshirashukla, Kshiravalli, Kshiravidali, Kroshtri, Mahaveshta, Payasvini, Shreshtakanda, Shrigalika, Shukla, Sita, Svadukanda, Svadulata, Triparna, Vajivallabha, Vidali, Vidari, Vidarika, Vrikshavalli, Vrishyakanda, Vrishyavallika, Vrishyavardhini—; *Sinhalese:* Kiribadu—; *Tamil:* Nilappuchani, Palmodikka, Palmudangi, Pucharkkaraikkilangu, Valli—; *Telugu:* Bhuchakragadda, Chirugummudu, Devakanjanamu, Gummudu, Karkarukamu, Mettapalatige, Nallanelagummudu, Nelagummudu, Palamodikku—; *Tulu:* Nelakumbudu—; *Twi:* Dinsinkorro—; *Urdu:* Balaikand—; *Uriya:* Bhuinkokaru—.

4. **Ipomœa batatas** Poir. Encycl. Méth. VI (1804) 14.—Plate 663.

Prostrate annual herbs, glabrous or sparingly hairy. Tubers red, white or rarely yellow. Leaves ovate-cordate, acute angular or more or less lobed. Peduncles long, many-flowered. Flowers 5 cm. and upwards, purple. Sepals elliptic, shortly acute, glabrous. Corolla widely tubular, funnel-shaped. Stamens included. Ovary 4-celled. Seeds glabrous.

Distribution: A native of America.—Cultivated in India.

The root is sweet and cooling; aphrodisiac; useful in strangury, burning sensation, thirst, urinary discharges; causes "kapha" and "vata" (Ayurveda).

The root is sweet; fattening; stops diarrhœa; bad for the chest and the lungs (Yunani).

The roots are considered laxative.

In Malaya, the root is made into a drink to allay thirst in fever.

In the Gold Coast, the leaves are ground with salt and applied to whitlow, which bursts in 2-3 days.

Akim: Abrordwobanga—; *Annam:* Khoai lang—; *Antsianaka:* Anantaraona, Ovimango, Tsimanga—; *Ashanti:* Ntormmor—; *Assam:* Bogaalu, Goriaalu, Rangaalu—; *Awuna:* Anago—; *Banda:* Bangao—;

Bengal: Chinealu, Lalalu, Lalshakarkandalu, Rangaalu—; *Benue:* Kugundugu—; *Betsileo:* Ambizo, Bokala, M'Bizo, Ovihazo—; *Betsimisaraka:* Batata, Bege, Bele, Belena—; *Bombay:* Ratalu, Shakarkandu—; *Burma:* Kazwan, Myoukni—; *Cambodia:* Dam long—; *Canarese:* Genasu—; *Ceylon:* Velkelengu—; *Chinese:* Kan chu—; *Cochin China:* Khoai lang—; *English:* Sweet Potato—; *Ewe:* Anagote, Dzete—; *Fanti:* Saantom—; *French:* Apichu, Artichaut des Indes, Batate, Patate douce, Patate de malaga—; *Ga:* Atomo, Blorfo atomo—; *Gujerati:* Kanangi, Sakaria—; *Hausa:* Dankali—; *Hindi:* Mitaalu, Shakardand—; *Hova:* Tromanga, Vihazo, Vomanga, Vorondro—; *Kano:* Dankali—; *Konkani:* Kanang, Konong—; *Krepi:* Anagote—; *Krobo:* Anango, Atomo—; *Laos:* Men keo—; *La Reunion:* Patate—; *Malaya:* Fah foon, Hua fen—; *Malayalam:* Kapakalenga—; *Manedjia:* M'Bodo—; *Marathi:* Ratali—; *Mexican:* Camotli—; *Nasirabad:* Gajarlahori—; *Newari:* Fukum—; *New Zealand:* Kumara—; *Parbutiah:* Kerkalu—; *Persian:* Lardaklahori, Zaminkanda—; *Philippines:* Camote—; *Portuguese:* Batata doce, Batateira—; *Punjab:* Shakarkand—; *Sanskrit:* Kandagranthi, Pichhila, Pindalu, Pinditaka, Romashakandaka, Svadukandaka—; *Santal:* Sakarkenda—; *Sind:* Gajarlahori—; *Sinhalese:* Batala—; *Sokoto:* Dukuma, Kudaku—; *Tamil:* Sakkareivelleikilangu, Vallikilangu—; *Telugu:* Chelagada—; *Tongking:* Khoai day—; *Twi:* Kokotino, Ntormmor—; *Urdu:* Shakarkanda—; *Visayan:* Tigsi—; *Western Ashanti:* Abrordwobanga, Asikuma—; *Yola:* Kugundugu—; *Zanfara:* Dukuma, Kudaku—.

5. **Ipomœa pes-tigrides** Linn. Sp. Pl. (1753) 162; Wight Ic. t. 836.—PLATE 664.

Stems twining, clothed with long spreading hairs. Leaves 3.8-10 cm. diam., rotundate in outline, usually more or less deeply palmately 5-9-lobed, sometimes 3-lobed or occasionally entire; lobes ovate, acute or acuminate, narrowed at the base, hirsute on both surfaces; petioles 3.8-7.5 cm. long, hairy. Flowers sessile, 3 or more in a head; peduncles 2.5-7.5 cm. long, very hairy; outer bracts nearly 2.5 cm. long, the inner about 1 cm. long, all ovate-oblong, subobtuse, very hairy. Sepals 8-13 mm. long, densely hairy and ciliate with long stiff hairs, the 2 outer sepals broader than the inner,

ovate-lanceolate, the 3 inner linear-oblong, acute. Corolla about 2.5 cm. long, tubular-campanulate, white or pale pink. Capsules 5 mm. diam., globose, glabrous, papery, concealed in the calyx. Seeds grey-pubescent.

Distribution: More or less throughout India, Ceylon.—Malaya, China, Polynesia, tropical Africa.

The root is used as a purgative.

It is also used for boils and carbuncles, and in the treatment of dog-bites.

Bengal: Langulilata—; *English:* Tiger's Foot, Bindweed—; *Hasada:* Cutulutur—; *Malayalam:* Pulichuvatu—; *Naguri:* Katkocanari, Pusikatanari—; *Sinhalese:* Diviadiya, Divipahuru—; *Tamil:* Pulichovadi, Punaikkirai—; *Telugu:* Chikunuvvu, Mekamadugu, Puritikada—; *Uriya:* Bilaipado—; *Visayan:* Malasandia, Salasandia—.

6. **Ipomœa reniformis** Chois. Convolv. Or. 64.—*Merremia emarginata* Hallier f. in Engl. Bot. Jahrb. XVI (1893) 552.—PLATE 665B.

Stems numerous, filiform, creeping and rooting at the nodes, not twining, clothed with scattered long soft hairs. Leaves 1.3-2.5 cm. broad, usually broader than long, reniform or ovate-cordate, obtuse, crenate, glabrous; petioles 6-25 mm. long, hairy. Flowers yellow, axillary, solitary or few (usually 2-3) together on a very short (often almost obsolete) peduncle; bracts small, ovate, acute, hairy; pedicels short. Sepals slightly hairy on the back, strongly ciliate on the margins, the 2 outer 4 mm. long, ovate, mucronate, the 3 inner longer reaching nearly 6 mm. long, subquadrate, deeply divided at the apex into 2 truncate divaricate lobes. Corolla 6 mm. long; lobes of the limb acute. Capsules 4-5 mm. diam., subglobose, smooth, surrounded by the slightly enlarged ciliate sepals. Seeds glabrous, dark chestnut coloured.

The strongly ciliate 2-lobed inner sepals are marked character.

Distribution: Bengal, Konkan, Deccan, Carnatic, Ceylon.—S.-E. and tropical Africa.

The plant is bitter, acrid, pungent; cooling, anthelmintic laxative, carminative; useful in diseases of the kidney, the bladder, the

lungs, the uterus; good in pains, fevers, strangury, urethral discharges, anæmias, fistula in ano, leucoderma; useful in diseases of the heart and the abdomen; reduces tumours (Ayurveda).

1. *Rose-flowered variety*:—Bitter bad taste; useful in diseases of the brain, the nose; good for weakness, paralysis, wounds, inflammations, headache.—2. *Yellow-flowered variety*:—The root is diuretic, laxative; applied in diseases of the eye and of the gums. —The plant is antipyretic; useful in headache, bronchitis, paralysis, inflammations, troubles of the nose, fevers due to enlargement of the liver (Yunani).

The plant is described as deobstruent and diuretic (S. Arjun).

The Hindus administer the juice in rat-bite, and drop it into the ear to cure sores in that organ. Its properties appear to be more fanciful than real, though, like others of the genus, it is purgative if taken in large doses (Dymock).

Arabic: Ajanulfar—; *Bengal:* Undirakanipana—; *Bombay:* Undirkani—; *Gujerati:* Undarakani—; *Hindi:* Musakani—; *Madras:* Yellikkadukirai—; *Persian:* Goromusha, Goshamosha, Satara—; *Sanskrit:* Adibhu, Akhukarni, Bahukarnika, Bahupadika, Bhudaribhava, Bhudharashraya, Bhumichari, Chanda, Chitra, Dravanti, Krishika, Mata, Mushakaparni, Mushakarni, Mushikavhaya, Nyagrodhi, Parnika, Patrashreni, Phanjipatrika, Pratiparnashipha, Pratyashreni, Putrashreni, Randa, Sachitra, Sahasramushi, Shambari, Shatamulika, Sukarnika, Suvarni, Undurkarni, Upchitra, Vikranta, Vrishaparni, Vrishchikakarni—; *Tamil:* Perettaikkiray—; *Telugu:* Toinnuatali—; *Urdu:* Chukakani, Sharadam—.

7. **Ipomœa obscura** Ker-Gawl. in Bot. Reg. (1817) t. 239. —PLATE 659A.

Annual; stems very long and slender, often purplish, twining, glabrous or with a few spreading hairs. Leaves 2.5-6.3 by 2-5 cm., broadly ovate, acuminate, subacute, entire, glabrous or more or less pubescent, thin; petioles 2.5-7.5 cm. long, slender, glabrous or pubescent. Flowers rather small, 1 or 2 (rarely 3) together; peduncles 2.5-5.7 cm. long; bracts minute, linear-lanceolate; pedicels 0.6-3.2 cm. long. Sepals 1 cm. long, subequal, oblong, subacute, shortly apiculate, minutely verrucose, veined. Corolla infundibuliform,

2.2 cm. long, yellow, or white with the plaits yellowish, with a small purple eye; mouth of limb wide, 2.5 cm. diam. with shallow apiculate lobes. Capsules 8 mm. long, ovoid, subacute, glabrous. Seeds dark brown, velvety.

Distribution: Throughout India, Ceylon.—Malaya, Mascarene Islands, Africa.

The leaves have a pleasant smell and mucilaginous taste; when toasted, powdered, and boiled with ghi they are considered as a valuable application in aphthous affection (Ainslie).

Malayalam: Cherutali—; *Gujerati:* Gumbadvel, Vadphudardi, Vajvel—; *Marathi:* Pilibonvari—; *Sanskrit:* Vachagandha—; *Sinhalese:* Mahamadu, Telkola—; *Tamil:* Chirudali, Chirutali, Kuruguttali, Sirudali, Siruttali—; *Telugu:* Nallakokkita—.

8. **Ipomœa sepiaria** Koenig in Roxb. Hort. Beng. (1814) 14; Wight Ic. t. 838.

Perennial; stems twining, slender, glabrous or more or less hairy. Leaves 2.5-7.5 by 2.2-5.7 cm., ovate, acute, entire, usually glabrous, cordate at the base with a wide sinus and rounded lobes; petioles 2.5-4.5 cm. long, slender, glabrous. Flowers in pedunculate subumbellate cymes; peduncles 2.5-15 cm. long, glabrous; bracts small, lanceolate, caducous; pedicels 2-13 mm. long, clavate in fruit. Sepals broadly elliptic, slightly apiculate, glabrous and with membranous margins, the 2 outer shorter than the inner, rugose on the back, scarcely 6 mm. long, the 3 inner a little more than 6 mm. long. Corolla tubular-infundibuliform, pale purple or whitish, 3.8 cm. or more long, the mouth suddenly widened; tube nearly 2.5 cm. long, purple within; lobes of the limb acute, shortly apiculate. Filaments hairy at the very base. Capsules 8 mm. long, ovoid, glabrous, 4- or 2- seeded. Seeds grey with silky pubescence.

Distribution: Throughout India, Ceylon.—Malaya, Formosa.

The tuber is sweet; cooling, alterative, uterine tonic, aphrodisiac; cures "tridosha" and ulcers (Ayurveda).

The juice is used as a deobstruent and diuretic.

It is considered a good antidote to arsenic.

Bengal: Bankalmi—; *Gujerati:* Hanumanvel—; *Hindi:* Bankalmi—; *Malayalam:* Tirutali—; *Marathi:* Amtivel—; *Porebunder:* Ratigumbadvel, Ratiphudardi—; *Sanskrit:* Asrabinduchhada, Lakshamana, Manjika, Nagaputri, Nagavha, Nagini, Puchhada, Putrada, Putrajanani, Putrakanda, Tulini—; *Sinhalese:* Rasatelkola—; *Tamil:* Manjigai, Manjigam, Talikkirai, Talikkodi—; *Telugu:* Mettatuti, Puritītige—; *Uriya:* Bilono, Mushakani—.

9. **Ipomœa reptans** (Linn.) Poir. Encycl. Suppl. III (1813) 460 in Obs.—*I. aquatica* Forsk. Fl. Aegypt.-Arab. (1775) 44.—Plate 665A (under *I. aquatica* Forsk.).

Annual or biennial; stems long, prostrate, trailing on mud or floating, thick, hollow, rooting at the nodes, glabrous. Leaves 5-12.5 by 3.2-7.5 cm. (occasionally narrower), elliptic-oblong or subdeltoid, acute, glabrous, base usually dilated, cordate or hastate with rounded or acute lobes, less commonly truncate; petioles 3.8-12.5 cm. long. Peduncles 1.3-10 cm. long, usually 1-5-flowered; bracts small, linear-lanceolate; pedicels 2.5-5 cm. long. Sepals 6-8 mm. long, subequal, oblong-lanceolate, subacute, membranous, glabrous. Corolla 4.5-5 cm. long, infundibuliform, the limb very pale purple (nearly white), throat and tube dull purple; lobes obscure. Filaments very unequal, hairy at the base. Ovary glabrous. Capsules 8 mm. long, ovoid. Seeds 4 or 2, minutely pubescent.

Distribution: Throughout India, Ceylon.—Tropical Asia, Africa and Australia.

1. *Terrestrial variety:*—The plant is sweet, aphrodisiac, galactagogue.—2. *Aquatic variety:*—a. *bitter:* anthelmintic; useful in leucoderma and leprosy.—b. *sweet:* cooling; useful in biliousness and fevers; increases "kapha" and "vata". (Ayurveda).

Grows in water, bad taste; carminative; lessens inflammation; useful in fever, jaundice, biliousness, bronchitis, liver complaints (Yunani).

The juice when dried is nearly equal to scammony in purgative properties (O'Shaughnessy).

In Assam, the weed is considered very wholesome for females who suffer from nervous and general debility.

In Burma, the juice is said to be employed as an emetic in cases of arsenic or opium poisoning.

In Cambodia, the buds are used in the treatment of shingles, the stems and leaves are prescribed in febrile delirium.

Annam: Rau muong—; *Bengal:* Kalmisak, Nalike, Patushaka—; *Bombay:* Nalichibaji—; *Cambodia:* Trakuon—; *Chinese:* Yung Ts'ai—; *Cochin China:* Rau muong—; *Ga:* Korkorle biakor—; *Gujerati:* Nalanibhaji—; *Hausa:* Awawaro, Furen gadu, Furen gyado—; *Hindi:* Kalmisag, Karmi, Patuasaga—; *Indo China:* Epinard annamite—; *Laos:* Phak bung—; *Marathi:* Nadishaka—; *Mundari:* Karmiara—; *North-Western Provinces:* Kalmisag, Nari—; *Pampangan:* Cangcong—; *Parbutiah:* Kulumsag—; *Punjab:* Ganthian, Nali, Nari—; *Sanskrit:* Kadambi, Kalaka, Kalambi, Kalambika, Kalashaka, Kechuka, Nadika, Pattashaka, Pechu, Pechuli, Shataparna, Shradhashaka, Vishvarochana—; *Sind:* Naro—; *Sinhalese:* Kankun—; *Tagalog:* Cangcong—; *Tamil:* Koilangu, Sarkareivalli—; *Telugu:* Tutikura—; *Tongking:* Rau muong—; *Urdu:* Narikakal—; *Visayan:* Tancong, Tangcong—.

10. **Ipomœa campanulata** Linn. Sp. Pl. (1753) 160; Wight Ic. t. 1375.

A large climber; stems twining, suffruticose, terete, striate, much-branched, the older glabrous, the younger finely pubescent. Leaves 7.5-15 by 6.3-14 cm., broadly ovate or suborbicular, acuminate, apiculate, thick, glabrous or finely pubescent on both sides; main nerves 12-14 pairs, conspicuous beneath; petioles 3.8-7.5 cm. long, softly velvety. Flowers in corymbosely branched, usually many-flowered cymes; peduncles 2.5-10 cm. long, stout; bracts quickly deciduous; pedicels 2.5 cm. long and more, thickened in fruit. Sepals subequal, nearly 1.3 cm. long, orbicular-oblong, obtuse, glabrous or finely pubescent, somewhat succulent, a little enlarged in fruit. Corolla tubular-campanulate, 7.5 cm. long, pale violet, dark purple within the tube; lobes of the limb usually conspicuous. Capsules 1.3 cm. diam., globose, glabrous, enclosed in the enlarged sepals. Seeds with silky hairs which often exceed 1.3 cm. long.

Distribution: Konkan, W. Ghats, Deccan, S. M. Country, N. Kanara, Ceylon.—Malaya.

It is said to be an antidote to snake poison; but neither the leaves nor the stem are (Mhaskar and Caius).

Canarese: Karihuginniyahambu, Kuginiballi—; *Marathi:* Goili, Tugelmi—.

11. **Ipomœa pes-capræ** Sw. Hort. Suburb. (1818) 35.—*I. biloba* Forsk. Fl. Aegypt.-Arab. (1775) 44.—PLATE 667A (under *I. biloba* Forsk.).

Root large, long, with a thick brown bark; stems numerous, very long, prostrate, weak, rarely twining, cylindric, glabrous. Leaves 3.8-5.7 by 5-7.5 cm., usually broader than long, usually deeply 2-lobed (the division often extending ½-way down, though sometimes the leaf is merely emarginate), fleshy, conspicuously parallel-veined, glabrous, cuneate or truncate at the base; petioles 2.5-9 cm. long, glabrous. Flowers large, usually solitary (sometimes 2-3); peduncles erect, 2.5-11.5 cm. long; bracts beneath the pedicels lanceolate, caducous; pedicels 1.6-4.5 cm. long, stout. Calyx glabrous, the 2 outer sepals smaller than the inner, 8 by 6 mm., oblong, obtuse, apiculate, the 3 inner 1.3 by 1 cm., elliptic-oblong, obtuse or emarginate, apiculate. Corolla 3.8-5 cm. long, tubular-infundibuliform, brilliant rose-purple with a deeper colour in the tube, glabrous; lobes shallow, acute, apiculate. Filaments dilated and hairy at the base. Ovary glabrous. Capsules 1.3-1.6 cm. long, ovoid, glabrous. Seeds villous.

Distribution: Sea-shores of both hemispheres throughout the tropics.

The herb is cooling, astringent to the bowels, stomachic, laxative; useful in diarrhœa, pains, vomiting; causes "vata" (Ayurveda).

The leaves are applied externally in rheumatism and colic. The juice is given as a diuretic in dropsy and at the same time the bruised leaves are applied to the dropsical part.

In Madagascar, the leaves are much used for inflammation of the legs, prolapsus ani, whitlow, colic, and rheumatism.

The plant enters into the composition of Cambodian remedies for blennorrhagia and piles.

Bengal: Chhagulkuri—; *Betsimisaraka:* Vahidalandana—; *Bicol:* Arodayday, Bagasoa, Canigang, Catangcatang, Darípay, Lagayray,

Lambayong, Lampayong—; *Bombay:* Marayadavel, Marjadvel, Marjavel—; *Burma:* Pinlaikazum—; *Cambodia:* Trakuon Kantek—; *Canarese:* Adumbaballi, Bangadaballi, Kempubangadaballi—; *Cutch:* Ravarapatri—; *English:* Goat's foot Creeper—; *French Guiana:* Patate de mer—; *Gujerati:* Marjadavela—; *Hindi:* Dopatilata—; *Ilocano:* Lambayong—; *Iloilo:* Polangpolang—; *La Reunion:* Batatran, Patate ă Durand—; *Madagascar:* Patate ă Durand—; *Madras:* Mugelkadilei—; *Malay:* Tapah Kudah—; *Malayalam:* Atampa, Chuvannatampu—; *Marathi:* Marjadvel, Maryadvel, Sumudraphen—; *Porebunder:* Aravela—; *Sanskrit:* Manmatha, Maravalli, Maryada, Raktapushpa, Sagara, Sagaramekhala, Yugmapatra—; *Sinhalese:* Mudubintamburu—; *Tagalog:* Arodayday, Bagasoa, Canigang, Catangcatang, Daripay, Lagayrai, Lambayong, Lampayong—; *Tamil:* Adambu, Adappangodi, Attukkal, Musattalai—; *Telugu:* Balabanditige, Bedatige, Chivulapillitige—; *Tulu:* Adumbuburu—; *Uriya:* Kanchonaluota, Kansarinata, Nadialunoi, Rongopalnoti—; *Visayan:* Bagasoa, Canigang, Daripay, Lampayong—.

12. **Ipomœa dissecta** Willd. Phytogr. (1794) 5, t. 2. f. 3.

Annual, glabrous, with a short stout stem and numerous prostrate slender angular branches 15-60 cm. long, not or rarely twining. Leaves very variable, digitate, or the upper sometimes pedate; lobes 3-7, linear-lanceolate, irregularly and acutely serrate; petioles 6-13 mm. long, with axillary stipule-like leaves at their base. Flowers usually solitary; peduncles 1.3-3.8 cm. long; bracts near the flower minute, lanceolate, acute, or flowers subsessile among leaf-like pectinate bracts. Sepals 5 mm. long, oblong-lanceolate, glabrous but rough outside with prominences, cuspidate, recurved at the apex. Corolla white, tubular, 8-13 mm. long, glabrous, acutely 5-lobed. Ovary 3-celled. Capsules 4-6 mm. diam., subglobose, glabrous, 3- or 6- valved. Seeds usually 3, pubescent.

Distribution: W. India and the Deccan, Ceylon.—Tropical Africa and Australia.

In the Gold Coast, the leaves are used to cure chest complaints of children.

Hausa: Sawu dubu—.

13. **Ipomœa tuberosa** Linn. Sp. Pl. (1753) 160.

A coarse, woody, perennial, glabrous vine reaching a length of 15 m. and 10 cm. or more in diam. Leaves 12-20 cm. diam., very deeply palmately 7-parted, the lobes lanceolate, acuminate, entire, base cordate. Flowers about 5 cm. long, axillary, solitary, or several on a peduncle, long-peduncled, the peduncle thickened at the apex. Sepals green, about 2.5 cm. long. Corolla campanulate, yellow, about 5 cm. diam. Capsule globose, 2.5-3 cm. diam., loosely enveloped by the accrescent calyx-lobes. Seeds large, about 2 cm. long.

Distribution: A native of tropical America.—Cultivated in India.

The tuber is a drastic purgative.

English: Spanish Arbour-vine—; *French Guiana:* Liseron a tubercules—; *La Reunion:* Liane de Gondelour, Liane sultane jaune—; *Mexico:* Caxtlatlapan, Totoicxitl—.

14. **Ipomœa dasysperma** Jacq. Ecl. I, 132. t. 89; Bot. t. 8788.

Glabrous. Leaves pedate, lobes 5-7, unequal, elliptic or lanceolate, subentire. Peduncles mostly 1-flowered. Sepals ovate, obtuse; corolla large, yellow, with a purplish eye. Seeds villous, margins woolly.

Roxburgh only knew it in cultivation. Pedate leaves occur, and 1-flowered peduncles are not rare in *I. palmata.* The only remaining differential character is the colour of the corolla; but this is by no means a pure yellow in *I. dasysperma;* the tube is purplish and there are often purplish streaks on the limb. (C. B. Clarke.)

Distribution: Rohilkhand, Deccan Peninsula.

The seeds are used in hydrophobia.

Gujarat: Dipdavel—.

15. **Ipomœa hispida** Roem. and Schult. IV (1819) 238.—*I. sessiliflora* Roth.; Wight Ic. t. 169.—*I. eriocarpa* R. Br. Prodr. (1810) 484.

Stems twining, slender, terete, clothed with appressed or spreading hairs. Leaves 4.5-7.5 by 2-3.8 cm., ovate or ovate-oblong, acute,

often apiculate, more or less hairy on both surfaces and with hairy margins, base cordate with rounded lobes; petioles 2.5 cm. long, densely hairy with deflexed hairs. Flowers 1-3 (rarely more in a head); peduncles very short, under 6 mm. long; bracts 4-6 mm. long, linear, hairy; pedicels very short or 0. Sepals not or scarcely enlarged in fruit, very hairy, rather less than 1.3 cm. long, with a long, linear acumen from an ovate base, the outer sepals broader than the inner. Corolla 13 mm. long, campanulate, pink, pubescent in the upper part and with small tufts of hairs at the apices of the small acute lobes. Ovary densely hairy. Capsules 6-8 mm. diam., globose, hairy. Seeds glabrous, minutely foveolate.

Distribution: Throughout India, Ceylon.—Afghanistan, tropics of the Old World.

The plant is boiled in oil and used as a cure for headache, rheumatism, leprosy, ulcers, and epilepsy.

Assam: Kalman—; *Bijnor:* Hara—; *North-Western Provinces:* Bhanwar, Harankhuri—; *Punjab:* Bhanwar—; *Telugu:* Puritittige—; *Uriya:* Paninoi—.

OPERCULINA Silva Manso.

Large climbing herbs; stems winged. Leaves entire or lobed. Flowers large, axillary, solitary or in few-flowered cymes. Sepals 5, large, glabrous, increasing and thickening in fruit, at length splitting irregularly from the tip. Corolla infundibuliform, rarely campanulate; tube with 5 vertical smooth bands. Stamens 5; filaments filiform; anthers large, at length contorted; pollen not echinulate. Ovary 2-celled, glabrous; ovules 4; style filiform; stigma 2-globose. Capsule valveless, the epicarp circumscissile above the middle, the cap carrying away the style; endocarp at length irregularly rupturing. Seeds often solitary, black, glabrous.—Species 20.—Tropical America, Asia.

O. turpethum Silva is used medicinally in the Philippine Islands. Its root and rhizome are official in France and Spain, its root and stem in Great Britain, its root in Portugal.

1. **Operculina turpethum** Silva Manso Enum. Subst. Braz. (1836) 16 and 40 (*turpetum*).—*Ipomœa turpethum* R. Br. Prodr. (1810) 485.—Plate 666 (under *Ipomœa turpethum* R. Br.).

Perennial with milky juice; root long, slender, fleshy, much-branched; stems very long, twining and much twisted together, angled and winged, pubescent, tough and brown when old. Leaves 5-10 by 1.3-7 cm., ovate or oblong, rarely slightly lobulate, subacute, mucronate, more or less pubescent on both sides especially when young, minutely reticulately veined, base cordate or truncate; petioles 2-5 cm. long, pubescent. Cymes few-flowered; peduncles stout, 2.5-5 cm. long; bracts large, lanceolate, pubescent reaching 2.5 cm. long, caducous, often pinkish; pedicels 0.6-2.5 cm. long, stout, pubescent, slightly thickened upwards. Outer sepals up to 2.2 cm. long in flower, much enlarged in fruit, broadly ovate or suborbicular, obtuse, mucronate, concave, pubescent; the 3 inner sepals smaller, scarcely 2 cm. long, very thinly membranous, glabrous, apiculate. Corolla white, 3.8-5 cm. long, subcampanulate. Anthers nearly 8 mm. long, narrowly oblong, cordate. Capsules 13-8 mm. diam., globose, enclosed in the enlarged brittle very imbricate sepals, glabrous or faintly pubescent.

Distribution: Throughout India, sometimes cultivated, Ceylon.—Malay Islands, tropical America, Mauritius, Philippines, tropical Africa, Australia.

The root is bitter, sweet, with a sharp taste; heating, anthelmintic, purgative, antipyretic, alexiteric; useful in ascites, leucoderma, itch, ulcers, constipation, abdominal troubles, inflammation, anæmia, fevers, biliousness, piles, erysipelas, tumours, jaundice, consumption, ophthalmia, bites from insects; good in diseases of the liver, the heart, the eye; causes "vata".—The black variety is a powerful drastic; useful in loss of consciousness, burning sensation, intoxication.—The white variety is a moderately mild cathartic; useful in bilious fevers, inflammations, and diseases of the abdomen.—The red variety is sweetish acrid; useful in "kapha" (Ayurveda).

The root is bitter; purgative; bechic, expectorant; useful in biliousness, tremors of the body, diseases of the brain, paralysis, pains in the muscles, bronchitis, pains in the joints and in the chest;

removes bad humours.—The black variety should not be used (Yunani).

In Western India, the flowers are applied to the head in hemicrania.

The *turpeth* root, notably the white variety of it, is quite equal to *jalap* and superior to *rhubarb* in its action, and preferable to both for having no nauseous smell or taste, and for being a very efficient and satisfactory purgative when used alone. Its dose is somewhat larger than that of jalap, but this is no disadvantage, as long as it is safe and free from nauseous taste and smell. The dose is larger only by 10 or 15 grains. As a cathartic and laxative, the *turpeth* root is useful in all the affections in which either jalap or rhubarb is indicated. The best way of administering it is in simple powder; but it may also be employed in combination with cream of tartar in equal proportion, and with or without a few grains of ginger in each drachm of the compound powder. The dose of the simple powder is from fifty to seventy grains, and of the compound powder from a drachm to ninety grains (Moodeen Sheriff).

About two scruples of the root are rubbed into a pulp with water, and taken with the addition of rock salt and ginger or sugar and black pepper.

In Ceylon, the tuberous roots are used as a purgative and considered a good substitute for Jalap.

There are two varieties of the root—the black and the white—the black is a powerful irritant and drastic and should be avoided. The white variety used by Indian physicians is a moderate or mild cathartic. I have used it as a mild hydragogue in the hospital in acute constipation of fevers, chronic constipation, in ascites with cirrhosis of liver, in enlargement of spleen, and in all other cases where a purgative was considered necessary. The simple powder in 40 to 60 grains may be administered to produce the desired effect. In its action, it is as efficacious if not better than jalap (Koman).

The root is prescribed in the treatment of snake-bite (Charaka, Sushruta, Vrindamadhava, Roberts), and scorpion-sting (Sushruta,

Chakradatta); but it is not an antidote to either snake-venom (Mhaskar and Caius) or scorpion-venom (Caius and Mhaskar).

A preliminary chemical examination of the rhizome was carried out by Janakiram (16th Ind. Sc. Congress; Madras, 1929).

Arabic: Turbund—; *Bengal:* Dhudkalmi, Dudiyakalmi, Teori—; *Bombay:* Nishotar, Thutkari—; *Canarese:* Alutigade, Bilenagadanti, Bilitigade, Devadanti, Nagadanti, Tigade, Tigadikeputigadda—; *Deccan:* Tikuri—; *English:* False Jalap, Indian Jalap, Indian Rhubarb, Turbeth Root, Turbith, Turpeth—; *French:* Turbith des officines, Turbith végétal—; *Gujerati:* Nahotara, Nashotar—; *Hindi:* Nisotar, Nisoth, Nukpatar, Pitohri, Tarbal, Tarbud, Trabal—; *Malayalam:* Chivaka, Rochani, Sarala, Tribhandi, Trikolpakonna—; *Marathi:* Nishottara—; *Punjab:* Chitabansa, Nisot, Turbud—; *Sanskrit:* Ardhachandra, Aruna, Kalameshi, Kalaparni, Kali, Kalingika, Kumbhadhatri, Laghurochani, Malavika, Masuravidala, Masuri, Nandi, Paripakini, Rechani, Rochani, Saha, Sara, Sarana, Sarasa, Sarata, Sarvanubhuti, Shyama, Susheni, Suvaha, Tribhandi, Triputa, Trivela, Trivrit, Trivrittika, Vidala—; *Santal:* Banætka—; *Sinhalese:* Trastavalu—; *Spanish:* Turbit de la India—; *Tamil:* Adimbu, Kumbam, Kumbanjan, Kunagandi, Paganrai, Samaram, Saralam, Sivadai, Sivedai—; *Telugu:* Ettategada, Nallategada, Tegada, Tellategada—; *Urdu:* Turbud—; *Uriya:* Dudholomo—.

MERREMIA Dennst.

Shrubs or herbs usually climbing; stems not or rarely winged. Leaves alternate, entire, lobed or divided. Flowers axillary, solitary or in few-flowered (rarely many-flowered) cymes; peduncles usually long. Sepals 5, subequal, elliptic or lanceolate usually acuminate (rarely rounded or truncate), convex, usually slightly enlarged and thickened in fruit. Corolla campanulate or infundibuliform, usually white, with 5 vertical bands which are usually marked by 5 dark violet lines; limb plicate, margin slightly lobed. Stamens 5, unequal, included or exserted; filaments filiform; anthers usually twisted; pollen usually with longitudinal folds never echinulate. Ovary 2-4-celled; ovules 4; style filiform; stigma 2-globose. Capsule 4-valved, 1-4-celled, the style sometimes separating with a small

operculum. Seeds 4 (rarely fewer), dull, usually glabrous.—Species 70.—Warm countries.

1. Leaves palmately 5-7-lobed. Root fibrous .... 1. *M. vitifolia.*
2. Leaves entire or occasionally 3-lobed
   Peduncles less than 2.5 cm. long. Sepals elliptic, subobtuse, mucronate .... 2. *M. tridentata.*

M. alata Rendle is used medicinally in the Gold Coast.

1. **Merremia vitifolia** Hallier F. in Engl. Bot. Jahrb. XVI (1893) 552.—*Ipomœa vitifolia* Sw. Hort. Brit. ed. 2 (1830) 372.—PLATE 667B (under *Ipomœa vitifolia* Sw.).

A perennial twiner; stems long, stout, much-branched, the young ones clothed with spreading deciduous hairs. Leaves 5-15 cm. diam., the young ones bronze-coloured, all palmately cut about $^1/_3$ the way down or a little more, into 5 or sometimes 7 triangular acuminate lobes, more or less hairy above and on the nerves beneath, margins coarsely serrate-dentate, base cordate; petioles 1.3-5 cm. long, patently hairy. Flowers 1-7 in pedunculate cymes; peduncles 6-13 mm. long, patently hairy; buds pointed; bracts linear, caducous. Calyx more or less densely clothed outside with long spreading hairs; sepals rather more than 1.3 cm. long, enlarged in fruit, broadly elliptic, obtuse, the outer slightly shorter, apiculate. Corolla yellow, 2.5-5 cm. long, subcampanulate; bands distinct, strongly lineate. Capsules 1.3 cm. diam., subglobose. Seeds glabrous.

Distribution: Throughout India (except the N.-W. dry area), Ceylon.—Malay Islands.

The plant is given in strangury and urethral discharges.

The juice is in the Konkan considered cooling and diuretic; it is given with milk and sugar. A *lep* is prepared, consisting of the juice, with lime juice one part, opium ½, and *Coptis teeta* ¼, which is applied around the orbit of the eye in inflammation.

The Mundas of Chota Nagpur eat the root raw as a remedy for stomach-ache.

Bombay: Nawal—; *Burma:* Kyahinkalænway—; *Malay:* Akar bulang bulu—; *Mundari:* Butreda, Buttasad, Tuiusangga—; *Sadani:* Banbut—.

2. **Merremia tridentata** Hallier f. in Engler Bot. Jahr. XVI (1893) 552.—*Ipomœa tridentata* Roth in Roem. Arch. Bot. I, pt. 3 (1798) 38.—Rheede Hort. Mal. XI, t. 65.

Perennial with a small woody rootstock; stems elongate, prostrate, not twining, slender angular, glabrous. Leaves 13-25 by 1.6-6 mm., linear-hastate or oblong-obovate, the linear leaves usually acute, the obovate ones obtuse, often deeply emarginate and 3-toothed at the apex, all glabrous and dilated at the base into toothed auricles; petioles very short, filiform, or the leaves sessile. Flowers axillary; peduncles 8-22 mm. long, filiform, solitary, with minute alternate lanceolate bracts beneath the pedicels; pedicels 1-3, stout, somewhat clavate, 5 mm. long. Sepals 4-5 mm. long, elliptic, subobtuse, strongly mucronate (especially the inner ones), glabrous, the outer rather shorter than the inner. Corolla pale yellow, less than 13 mm. long, bands not very strongly lineate. Capsules 4 mm. diam., globose. Seeds trigonous, with a longitudinal ridge on the rounded back, glabrous.

Distribution: All plain districts of Madras Presidency, W. Peninsula, Bengal, Ceylon, Malay Peninsula.—Angola, Mauritius, Madagascar.

The plant is tonic and laxative; it is used in rheumatism, piles, and urinary disorders.

Malay: Kong kong pasir—; *Sanskrit:* Prasarini—.

CONVOLVULUS Linn.

Herbs or undershrubs erect, prostrate or rarely twining, sometimes spinescent. Leaves entire, toothed or lobed. Flowers axillary, solitary or in cymes. Sepals 5, usually subequal. Corolla campanulate or infundibuliform; limb plicate, subentire. Stamens 5, attached near the base of the corolla, included; filaments filiform, often unequal. Ovary 2-celled; ovules 4; style filiform; stigmas 2, linear or oblong, distinct. Capsule 2-celled, 4-valved or irregularly rupturing. Seeds normally 4, glabrous.—Species 180.—Temperate, a few tropical.

A. Not spiny
  1. Prostrate .... 2. *C. glomeratus.*
  2. A twining herb .... 1. *C. arvensis.*

B. Spiny
A low intricate shrub .... 3. *C. spinosus.*

The root is cathartic and diuretic; the leaves mucilaginous.

The following species are used medicinally in Europe—*C. althœoides* Linn., *C. arvensis* Linn., *C. cantabrica* Linn., *C. scammonia* Linn.,—; in Annam—*C. arvensis* Linn.—; in Asia Minor—*C. scammonia* Linn.—; in the Levant—*C. althœoides* Linn., *C. scammonia* Linn.—; in North Africa—*C. althœoides* Linn.—; in the Canary Islands—*C. althœoides* Linn., *C. floridus* Linn., *C. scoparius* Linn.—; in Guinea— *C. spinosus* Burm. f.—; in South Africa—*C. farinosus* Linn., *C. hastatus* Thunb., *C. ulosepalus* Hallier fil.—; in Brazil—*C. edulis* Vell., *C. giganteus* Manso., *C. paulistanus* Manso., *C. pendulus* Manso., *C. polyrrhizos* Manso., *C. puniceus* Manso., *C. tuberosus* Vell., *C. varius* Vell., *C. ventricosus* Manso.—.

OFFICIAL :—The root of *C. Scammonea* Linn. (Portugal); *C. Scammonia* Linn. (Belgium, France, Italy, Spain); *C. Scammonium* Linn. (Switzerland, Turkey); *C. Turpethum* Linn.=*Ipomœa Turpethum* R. Brown (Portugal).

1. **Convolvulus arvensis** Linn. Sp. Pl. (1753) 153.—PLATE 668C.

Rootstock creeping. Stem trailing or twining when near support, often twisted upon itself, more or less angular, glabrous or pubescent. Leaves 2.5-6.3 cm. long, variable in breadth, ovate or oblong, glabrous or nearly so, obtuse and apiculate at the apex, auriculate or hastate at the base, the lower leaves often lobed; petioles 6-20 mm. long. Peduncles 2.5-5 cm. long, axillary, solitary, slender, with a pair of small linear bracts at the apex from which the pedicels issue; pedicels 3-25 mm. long, solitary or 2-3, in which case each pedicel except the primary one has 2 small bracts beyond the middle. Sepals 5-6 mm. long, broadly elliptic, obtuse or truncate, glabrous or nearly so, unequal. Corolla reaching 2 cm. long, broadly infundibuliform, pink or white, glabrous. Stamens unequal. Ovary glabrous; stigmas 2.5 mm. long, filiform. Capsules 6-8 mm. diam., globose, glabrous. Seeds subtrigonous, dark reddish brown, glabrous or puberulous.

Distribution: A common plant widely distributed throughout the world.

The root possesses cathartic properties. The Sindhis use it as a substitute for jalap.

Annam: Day bim bim, Khien nguu tu—; *Bengal:* Gandhbhadali, Gondal—; *Catalan:* Campaneta, Campanilla, Corretjola, Curriola—; *English:* Deer's foot Bindweed, Field Bindweed, Small Bindweed—; *French:* Bédille, Liseret, Liseron des champs, Liset, Lisette, Lixet, Petit liseron, Villée, Vreille, Vrillée, Vrillée commune, Petite vrillée, Vrillie, Vroncelle—; *German:* Ackerwinde, Winde—; *Gujerati:* Nari, Veladi—; *Harboi Hills:* Bachki—; *Hindi:* Beri, Haranpadi, Harinpadi, Hiranpaddi, Prasarna, Prasarni—; *Italy:* Vilucchio, Viticchio, Volubile—; *Kathiawar:* Haranpago, Khetranphudardi, Veldi—; *Kotra:* Dandroneri—; *Malta:* Bindweed, Vilucchio, Leblieb tar-raba—; *Marathi:* Haranpag, Chandvel—; *Punjab:* Harinpadi, Hiranpaddi—; *Sanskrit:* Bhadrabala, Prosarani, Rajbala, Sarana—; *Sind:* Hirnpug—; *Spanish:* Correhuela—; *Wad:* Bakarbali—.

2. **Convolvulus glomeratus** Choisy ex DC. Prodr. IX (1845) 401; Wight Ic. t. 1366.

Stems 0.45-0.9 m. long, many from a vertical root, prostrate, slender, more or less pubescent. Leaves 2.5-3.8 by 1-1.3 cm., oblong, acute, mucronulate, more or less sparsely pubescent, base rounded or subcordate; petioles 3 mm. long, slender. Flowers in dense globose villous heads, on axillary solitary hairy slender peduncles 1.3-7.5 cm. long; bracts foliaceous, ovate-lanceolate, 1.3-2 cm. long, hairy and with densely ciliate margins. Sepals nearly 1.3 cm. long, ovate-lanceolate, acuminate, very densely clothed with long silky hairs, the 2 outer sepals broader than the 3 inner. Corolla tubular, 1.3 cm. long, the upper part slightly pubescent outside; limb with 5 broadly-deltoid shallow, acute lobes, with a small tuft of hairs at the apex of each. Stamens equal. Ovary glabrous; stigmas 1.5-2 mm. long, clavate or elliptic-oblong. Capsules 5 mm. diam., subglobose, glabrous. Seeds smooth, not tuberculate.

Distribution: Punjab, Rajputana, Sind, Baluchistan, Kathiawar.—Afghanistan, W. tropical Africa.

In Las Bela, the plant is used as a purgative (Hughes-Buller).

Gujarat: Runchhaliveldi—; *Las Bela:* Richak—.

3. **Convolvulus spinosus** Burm. f. Fl. Ind. 47, t. 19 f. 4 (non Desr. nec Eichw).

Apparently a low but intricate shrub, spiny, all over shortly and appressedly cinereo-sericeous, branches repeatedly intricate, stiff, thinly spinose at the apex. Leaves 8-6 mm. long, minute, elliptic, slightly acute, attenuate at the base, subpetiolate, concave-subplicate above, the upper leaves linear, scale-like. Flowers in the lower part of the younger branches at the apex of a patent stiff branchlet, very short-pedicelled, erect, solitary, rarely 2-3-nate. Bracteoles 2, minute, at the base of the pedicel. Upper old flowering branchlets sterile, abbreviate, spinescent. Calyx oblong, appressedly hirsute; sepals ovate, cucullate, imbricate, obtuse, sometimes submucronate. Corolla silky-hirsute, lobate, 3-4 times as long as the calyx. Ovary hirsute.

Distribution: Baluchistan.—Afghanistan, Persia.

At Turbat in Baluchistan, the plant is considered as a strong purgative (Hughes-Buller).

Bori Tahsil: Lawanarasu—; *Kila Saifulla:* Sahsa—; *Kohlu:* Tatak, Titok—; *Kulanch:* Dolako—; *Las Bela:* Dahelkur—; *Loralai:* Luniaso—; *Pab Hills:* Dehlakur—; *Turbat:* Ritachk—.

Evolvulus Linn.

Small herbs or undershrubs, prostrate or erect, never climbing, often sericeo-pubescent or pilose. Leaves small, entire, often distichous. Flowers small, white or bluish, axillary, solitary or in few-flowered pedunculate cymes. Sepals 5, subequal, not enlarged in fruit. Corolla infundibuliform or subrotate; limb plicate, subentire. Stamens 5, included or exserted; filaments slender; anthers ovate or oblong. Ovary 2- (rarely 1-) celled; ovules 4; styles 2, distinct from the base, each cleft into 2 linear or subclavate stigmas. Capsule 4-2-valved. Seeds 4 or 2 (rarely solitary); cotyledons twice folded; radicle terete, much incurved.—Species 90. —Tropics and subtropics.

E. alsinoides Linn. is used medicinally in Hausa and in Madagascar.

1. **Evolvulus alsinoides** Linn. Sp. Pl. ed. 2 (1762) 392.—PLATE 668B.

A perennial herb with a small woody branched rootstock; stems numerous, often more than 30 cm. long, prostrate, spreading, slender, wiry, usually clothed with long spreading hairs, but sometimes quite glabrous. Leaves numerous 6-20 by 4-8 mm., elliptic-oblong, obtuse, strongly apiculate, usually acute at the base, densely clothed with appressed silky hairs; petioles very short, sometimes almost 0. Flowers light blue, solitary, or sometimes 2 from a pair of lanceolate bracts on the peduncle; peduncles very long, filiform, axillary; pedicels filiform. Calyx densely silky; sepals 4 mm. long, lanceolate, very acute. Corolla 5 mm. long. Capsules 3-4 mm. diam., globose, thin, 4-valved. Seeds usually 4, glabrous.

Distribution: Tropical and subtropical countries.

The plant is bitter, pungent; alexiteric, alterative, tonic, anthelmintic; useful in bronchitis, biliousness, epilepsy, leucoderma, teething of infants; brightens the intellect; improves complexion, appetite (Ayurveda).

The Mahomedan physicians believe that this plant has the power to strengthen the brain and memory.

It is used as a febrifuge with cumin and milk, also as an alterative, and with oil to promote the growth of the hair.

The leaves, stalks, and roots are all used in medicine by the Tamools, and are supposed to possess virtues in certain bowel affections. They are prescribed in infusion in the quantity of half a teacupful twice daily (Ainslie).

It is reputed to be a sovereign remedy for dysentery.

The plant is used in Ceylon as a bitter tonic and febrifuge.

The root is used by the Santals in intermittent fever of children.

The leaves are made into cigarettes and smoked in chronic bronchitis and asthma. The plant is astringent, useful in internal hæmorrhages.

In Madagascar, the root is considered antidiarrhœic.

The Hausas use this plant in medicine. The leaves are made into cigaretttes to be smoked in cases of chronic bronchitis and asthma.

This is administered by Hindu physicians in fevers attended with diarrhœa or indigestion in the form of a decoction of the drug with *Ocimum sanctum.* It was administered to several cases and did not appear to possess the properties attributed to it (Koman).

Bombay: Shankhavalli—; *Canarese:* Vishnukranti—; *Gujarat:* Jhinkiphudardi, Kalisankhavli—; *Hausa:* Ka fi malam—; *Hindi:* Shyamakranta—; *Madagascar:* Vahimpasika—; *Malayalam:* Vishnukranthi—; *Marathi:* Vishnukanta—; *Punjab:* Sankhpushpi—; *Sanskrit:* Laghuvishnukranta, Nilapushpi, Vishnugandhi, Vishnukranta—; *Santal:* Tandikodebaha—; *Sinhalese:* Vishnukranta—; *Tamil:* Vishnukarandi, Vishnukranthi—; *Telugu:* Vishnukranta—; *Tigrinia:* Eriraro—.

CRESSA Linn.

Small branched undershrubs, erect or diffuse, usually grey-pubescent. Leaves small, entire. Flowers small, sessile in the upper axils or in terminal clusters or spikes; bracts 2 beneath the calyx, not enlarging in fruit. Sepals 5, subequal, small, not enlarging in fruit, thin, imbricate. Corolla infundibuliform; tube short; lobes 5, distinct, imbricate. Stamens 5, exserted; filaments filiform; anthers oblong. Ovary 2-celled; ovules 2 in each cell; styles 2, distinct from the base, equal; stigmas captitate. Capsule 2-4-valved, 1-4-seeded. Seeds glabrous; cotyledons linear plicate.—Species 5.—Tropics and subtropics.

C. cretica Linn. is used medicinally in West Africa.

1. **Cressa cretica** Linn. Sp. Pl. (1753) 223.—PLATE 669.

An erect dwarf shrub 15-38 cm. high; stem slender, much-branched, very hairy. Leaves numerous, subsessile, 3-6 by 1.5-2.5 mm., ovate, acute, densely silky-hairy. Flowers white or pink, usually in small clusters in the axils of the upper leaves; pedicels very short; bracts 2, linear, hairy, 2.5 mm. long, appressed to the calyx. Calyx densely silky; sepals 3 mm. long, elliptic, obtuse, concave, ciliate. Corolla 5 mm. long, divided ½-way down; lobes oblong, subobtuse,

reflexed, hairy on the back near the tip. Capsules 4-5 mm. long, ovoid, pointed and pubescent at the apex. Seeds in fully ripe capsules usually solitary.

Distribution: Throughout India, Ceylon and all warm countries.

The plant is bitter, pungent; heating, alterative, anthelmintic, stomachic, tonic, aphrodisiac; enriches the blood; useful in consumption, leprosy, asthma, biliousness, urinary discharges (Ayurveda).

The plant has a sour bad taste; the leaves are tonic, aphrodisiac; improve the appetite (Yunani).

Bombay: Khardi—; *Ceylon:* Panittanki—; *Cutch:* Guna, Una—; *Gujerati:* Paliyo—; *Hindi:* Lana—; *Hinidan:* Buqans—; *Las Bela:* Bokuri—; *Marathi:* Chavala, Khardi, Rudanti—; *Nasik:* Chavel—; *Porebunder:* Patiyo—; *Sanskrit:* Amritasrava, Chanapatri, Dravanti, Madhusrava, Mahamansi, Palitaka, Romanchika, Rudanti, Rudantika, Sanjivani, Sravattaya—; *Sind:* Gun—; *Telugu:* Uppusanaga—; *Urdu:* Rudanti—.

CUSCUTA (Tourn.) Linn.

Leafless yellow or reddish, twining, parasitic annuals. Stems slender, sometimes filiform. Flowers small, white or rose-coloured, sessile or pedicellate, solitary or in lateral fascicles or short racemes; bracts small or 0. Calyx usually deeply divided; segments 5 (rarely 4), distinct or connate at the base, subequal. Corolla campanulate, ovoid or globose, usually with fimbriate or lobed scales near the base or below the stamens within; lobes 5 or 4, short, imbricate in bud. Stamens 5 or 4, inserted in or below the throat of the corolla-tube; filaments short; anthers short, obtuse, partially exserted. Ovary perfectly or imperfectly 2-celled; ovules 2 in each cell; styles 1 or 2; stigmas 2. Capsule globose or ovoid, dry or succulent, circumscissile or irregularly breaking up, 4-2-seeded. Seeds glabrous; albumen fleshy; embryo slender, spiral; cotyledons 0 or obscure.—Species 100. —Tropical and temperate regions.

A. Styles 1, short, stout. Stigmas ovoid, thick and fleshy ...... 1. *C. reflexa.*
B. Styles 2, distinct, elongate, slender. Stigmas capitate
  1. Scales on the corolla-tube absent .... 2. *C. hyalina.*
  2. Scales on the corolla-tube fimbriate .... 3. *C. chinensis.*

The seeds are purgative; the juice of the plant is considered styptic and antiphlogistic.

The following species are used medicinally in Europe—*C. epithymum* Linn., *C. europaea* Linn., *C. lupuliformis* Krocker—; in China—*C. chinensis* Lam., *C. japonica* Chois.—; in Brazil—*C. racemosa* Mart., *C. umbellata* Humb.—.

OFFICIAL:—The herb of *C. racemosa* Mart. and *C. umbellata* Humb. in Portugal.

1. **Cuscuta reflexa** Roxb. Corom. Pl. II (1798) 3, t. 104.—PLATE 668A.

Stems very long, rather stout, closely twining, branched, glabrous, pale greenish yellow, sometimes dotted with red. Flowers solitary or in umbellate clusters of 2-4 or in short racemes; pedicels short, glabrous, usually curved (rarely 0); bracts 1.5 mm. long, ovate-oblong, obtuse, fleshy. Calyx divided almost to the base; lobes 3 mm. long, slightly unequal, broadly ovate, obtuse, glabrous, fleshy. Corolla white; tube 6-8 by 4 mm., almost cylindric; lobes 2.5-3 mm. long, deltoid, acute, reflexed; scales almost at the base of the corolla-tube, large, oblong, subquadrate or somewhat obovate, fimbriate and incurved at the apex. Stamens in the throat of the corolla-tube; filaments scarcely any; anthers about ½-exserted beyond the top of the corolla-tube. Ovary ovoid; style simple, very short and thick; stigmas 2, distinct, large, thick and fleshy, 1.5 mm. long, ovoid. Capsules 6-8 mm. diam., depressed-globose, glabrous, circumscissile near the base. Seeds 2-4, large, black, glabrous.

Distribution: Throughout India, Ceylon.—Malaya.

The plant is acrid, bitter; astringent to the bowels, aphrodisiac, alterative, tonic; useful in diseases of the eye and of the heart, in biliousness, and " kapha " Ayurveda).

The herb has a bitter sharp taste; expectorant, carminative, tonic, anthelmintic, purgative; diaphoreitc, diuretic; purifies the blood and cleanses the body; lessens inflammation; useful in jaundice, pains in the muscles and the joints, heat of the brain, headache, paralysis, diseases of the spleen, vomiting, lumbago.—The seeds have a bitter bad taste; sedative, emmenagogue, diuretic; useful in diseases of

the liver and the spleen, quartan fever, chronic fevers, griping, hiccough; purify the blood and cleanse the bowels; the infusion is given in ophthalmia, the decoction in biliousness as a purgative (Yunani).

The seeds are regarded as carminative, and for this purpose are boiled and placed over the stomach. They are also applied as an anodyne. A cold infusion is given as a depurative. They constitute part of the *Kasus* or purgative medicine sold in the Punjab.

The native doctors of Sind and the Punjab regard the seeds of this plant as alterative, used along with Sarsaparilla to purify the blood.

The plant is purgative. It is used externally against itch, and internally in protracted fevers, retention of wind, and induration of the liver.

The stems are specially useful in bilious disorders.

In Lakhimpur, an infusion of the plant is said to make an excellent wash for sores. The natives say that it cleanses and brings about rapid healing (Carter).

Arabic: Kashus, Sharulzabiha—; *Assam:* Amarlati—; *Bengal:* Algusi, Hadialgusilutta—; *English:* Dodder—; *French:* Cuscute—; *Gujerati:* Amarabel—; *Hasada:* Araroara—; *Hindi:* Akashabela, Amarabela—; *Jaunsar:* Saragbali—; *Marathi:* Amarvela, Nirmuliakashavela—; *Naguri:* Araroar—; *Persian:* Aftimoon, Belparash—; *Punjab:* Amil, Nilathari, Niradhar, Zarbuti—; *Sanskrit:* Akashabhavana, Akashapavana, Akashavalli, Amaravallari, Amaravela, Dusparsha, Khavalli, Nilatar, Vyomavallika—; *Santal:* Alagjari—; *Tamil:* Kodiyagundal, Sadadari—; *Telugu:* Lanjasavaramu, Savarapukada, Sitammapogunulu, Sitasavaramu—; *Urdu:* Akashabel, Imalbel—; *Uriya:* Kolanirmuli—.

2. **Cuscuta hyalina** Roth Nov. Pl. Sp. (1821) 100 (non Wight).—*C. arabica* Wight Ic. t. 1371.

Stems very slender, closely twining, much-branched, forming often a tangled mass. Flowers in fascicles or in shortly pedunculate cymes or racemes; pedicels 0.5 mm. long; bracts 3 mm. long; lanceolate, acute. Calyx 3 mm. long, divided rather more than half way down; lobes 5 (rarely 4), ovate, acute or acuminate, slightly

unequal. Corolla 3 mm. long, 5- (rarely 4-) lobed; lobes 2 mm. long, ovate-lanceolate, very acute, or acuminate; scales 0. Filaments distinct, 0.6-0.85 mm. long. Styles 2, slender, distinct, 1.5 mm. long. Capsules 2.5 mm. diam., subglobose, membranous, irregularly breaking up from the base. Seeds 2-4, ovoid or suborbicular, compressed, 1.5 mm. diam., crowned by the persistent styles.

Distribution: W. Peninsula, Baluchistan.—Abyssinia.

In the Indian Desert, the plant, boiled in water, is taken against pain in the chest (Blatter and Hallberg).

Gujerati: Amarvel—; *Hindi:* Niradhari—; *Marathi:* Nirmuli—; *Porebunder:* Chidio, Mankhaniopindo—.

3. **Cuscuta chinensis** Lam. Encycl. Méthod. II (1786) 229.

Stems filiform, twining, much-branched, often forming a tangled mass. Flowers solitary or in shortly pedunculate cymes; pedicels short; bracts ovate, 1.25 mm. long. Calyx 2.5 mm. long, divided rather less than half way down; lobes deltoid-ovate, subobtuse, often with a tubercular keel on the back. Corolla 2.5 mm. long; lobes about equalling the tube, ovate-oblong, subobtuse; scales at the base of the filaments fimbriate. Filaments 0.8 mm. long. Styles 2, distinct, 1 mm. long. Capsules hardly 2.5 mm. diam., globose, hyaline, divided into 2 lobes by a deep furrow on top. Seeds 1.6 mm. long, usually 4.

Distribution: Greater part of India, Ceylon.—Persia, Australia.

The properties are the same as those of *C. reflexa* (Ayurveda).

In China, the young shoots are made into lotions for sore heads and inflamed eyes. The seeds are said to be tonic, diaphoretic, and demulcent.

Antsianaka: Bonaka—; *Awuna:* Vuvudranyi—; *Chinese:* T'u Hua—; *English:* Dodder—; *Ewe:* Vuvudranyi—; *Hausa:* Soyayaa—; *Krepi:* Mprakair—; *Malaya:* Tow fah—; *Nzima:* Brairzinleng nyairmang, Mairairhyiazo—; *Sinhalese:* Agamulanetirvel—; *Twi:* Dorme atrair, Mprabegu, Ntentene—.

———

SOLANACEAE.

Herbs or shrubs, erect, trailing or scandent (rarely trees). Leaves alternate, often in unequal pairs, rarely clustered, never truly opposite, entire, lobed or pinnate; stipules 0. Flowers regular, hermaphrodite (very rarely dioecious), in lateral terminal axillary or extra-axillary cymes, or on solitary or clustered pedicels; bracts and bracteoles 0. Calyx inferior; limb usually 5- (rarely 3-10-) lobed or toothed, usually persistent, often accrescent in fruit. Corolla infundibuliform, campanulate or rotate, often plicate; lobes 5 (rarely 10) or limb subentire. Stamens 5, on the corolla-tube; anthers ovate or oblong, dehiscing by apical pores or longitudinally. Ovary 2-celled or imperfectly 1- or 4- celled (rarely 3-5-celled); ovules many, on prominent peltate placentæ; style linear; stigma capitate or very shortly lobed. Fruit a berry or a circumscissile or valved capsule, usually 2-celled, many-seeded. Seeds compressed, discoid, or subreniform, with peripheric embryo, or seeds scarcely compressed with a straight embryo.—Genera 72. Species 1500.—Tropical and temperate; chief centre Central and S. America.

A. Corolla-limb plated or the lobes valvate. Fruit a berry. Seeds much compressed, subdiscoid
  I. Anthers opening by 2 pores at the apex
    Leaves entire, lobed or pinnatifid .... SOLANUM.
  II. Anthers oblong, dehiscing longitudinally
    a. Calyx in fruit small
      Flowers small. Pedicels solitary or paired .... CAPSICUM.
    b. Calyx in fruit enlarged, overtopping the berry
      1. Pedicels solitary. Calyx shortly lobed .... PHYSALIS.
      2. Flowers clustered, sessile or nearly so .... WITHANIA.
      3. Pedicels solitary. Calyx 5-partite .... NICANDRA.

B. Corolla-lobes more or less imbricate. Fruit a berry. Seeds compressed
  I. Pedicels solitary or few together. Calyx and corolla small .. LYCIUM.
  II. Pedicels solitary. Calyx foliaceous .... ATROPA.

C. Corolla-lobes plated or imbricate. Fruit capsular. Seeds somewhat compressed
  I. Flowers solitary. Calyx circumsciss .... DATURA.
  II. Pedicels solitary, distant .... SCOPOLIA.
  III. Corymb terminal, peduncled .... PHYSOCHLAINA.
  IV. Flowers unilateral, upper racemose .... HYOSCYAMUS.

D. Corolla-lobes induplicate-valvate. Fruit capsular.
  Flowers panicled .... NICOTIANA.

This Order contains some of the deadliest of poisonous plants, some of the most valuable of medicinal plants, and likewise some which provide the most nutritious of foods.

Therapeutically the members are mostly narcotic; some are more or less acrid and stimulating; others are tonic, diuretic, and diaphoretic..

Numerous alkaloids have been isolated—apoatropine, atropine, belladonnine, capsaicine, capsicine, choline, grandiflorine, hyoscine, hyoscyamine, mandragorine, meteloidine, nicoteine, nicotelline, nitotimine, nitotine, noratropine, norhyoscyamine, solaneine, solangustine, solanine, solanocapsine, tropacocaine, trigonelline, β-amino-4-ethylglyoxaline—.

The presence of a glucoside—scopoline—has also been recorded.

Official:—Atropine (France, Great Britain, Portugal, Spain, United States);—sulphate (Austria, Belgium, Denmark, France, Germany, Great Britain, Holland, Hungary, Italy, Japan, Norway, Russia, Spain, Sweden, Switzerland, Turkey, United States).

Hyoscyamine (France);—hydrobromide (Spain, United States);—sulphate (France).

Scopolamine (United States);—hydrobromide (Belgium, Denmark, France, Germany, Great Britain, Holland, Hungary, Italy, Japan, Russia, Spain, Sweden, Switzerland, Turkey, United States).

Atropa Belladonna Linn. (Austria, Belgium, Denmark, France, Germany, Great Britain, Holland, Hungary, Italy, Norway, Russia, Spain, Sweden, Switzerland, Turkey, United States)=*Belladonna baccifera* Lamk. (Portugal).

Capsicum annuum Linn. (Austria, Belgium, Denmark, Germany, Holland, Hungary, Japan, Norway, Russia, Sweden, Switzerland),—var. *fructu pyramidali longo* Brot. (Portugal); *C. frutescens* Linn. (United States); *C. longum* D.C. (Austria, Norway); *C. minimum* Roxb. (Great Britain).

Datura Stramonium Linn. (Austria, Belgium, Denmark, France, Germany, Great Britain, Holland, Italy, Japan, Norway, Russia, Spain, Sweden, Switzerland, Turkey, United States)=*Stramonium*

spinosum Lamk. (Portugal); *D. Tatula* Linn. (Great Britain, Portugal); *D. Tatura* Linn. (Japan).

Hyoscyamus muticus Linn. (Great Britain); *H. niger* Linn. (Austria, Belgium, Denmark, France, Germany, Great Britain, Holland, Hungary, Italy, Japan, Norway, Portugal, Russia, Spain, Sweden, Switzerland, Turkey, United States).

Lycium europaeum Linn. (*L. spinosum* Hass.) in Portugal.

Nicotiana Tabacum Linn. (*N. Havanensis* Lag.) in Portugal.

Physalis Alkekengi Linn. in France.

Scopolia japonica Maxim. (Japan).

Solanum Dulcamara Linn. (Austria, France)=*Dulcamara flexuosa* Moench. (Portugal); *S. nigrum* Linn. (France, Turkey)= *S. vulgatum* Willd. (Portugal) *S. tuberosum* Linn. (Belgium, France, Holland, Japan, Spain)=*Lycopersicum tuberosum* Mill. (Portugal).

SOLANUM (Tourn.) Linn.

Herbs or shrubs sometimes subscandent (rarely small trees), unarmed or prickly. Leaves alternate or subopposite, entire, lobed or pinnatisect, solitary or twin. Flowers in dichotomous or racemose lateral or terminal cymes. Calyx 5-10-lobed (rarely 4-lobed or subentire), unaltered or enlarged in fruit. Corolla rotate, rarely campanulate; tube short; limb plicate, usually 5-lobed. Stamens 5 (rarely 4-6) in the corolla-throat; filaments short; anthers oblong, often narrowed upwards, connivent in a short cone, opening by terminal pores or short slits. Ovary 2-celled, (rarely in cultivated forms) 3-4-celled; style columnar; stigma small. Berry small or large, globose or elongate. Seeds numerous, usually discoid; embryo peripheric.—Species 1225.—Tropical and temperate regions.

A. Unarmed
- I. An annual herb. Flowers in umbellate cymes .... 1. *S. nigrum.*
- II. A herb or undershrub. Pedicels long, densely spirally racemed .... 3. *S. spirale.*
- III. A shrub. Cymes laxly panicled .... 2. *S. dulcamara.*
- IV. A shrub or small tree, 1.8-6 m. high. Flowers white in corymbose cymes .... 4. *S. verbascifolium.*

B. Prickly (some varities of *melongena* rarely unarmed)
I. Herbs
a. Leaves 15 cm. or more long. Berry 2-3.2 cm. diam., densely clothed with long hairs .... 5. *S. ferox.*
b. Leaves not exceeding 10 cm. long. Berry 13-20 mm. diam., yellow or white with green veins, glabrous .... 8. *S. xanthocarpum.*
c. Leaves 7.5-15 cm. Berry 2.5-23 cm. .... 7. *S. melongena.*
II. Shrubs or undershrubs
a. Leaves 15 by 10 cm., lobes shallow, rarely deep, softly hairy above, never prickly .... 11. *S. torvum.*
b. Leaves exceeding 5 cm. long, more or less sinuately or pinnately lobed, prickly on the midrib
1. Flowers hermaphrodite
Berry 8 mm. diam., yellow .... 6. *S. indicum.*
2. Male flowers in a raceme. Female flowers solitary
Berry 2-2.5 cm. diam., yellow .... 13. *S. incanum.*
c. Leaves not exceeding 5 cm. long
1. Petioles and pedicels prickly
Berry 6-8 mm. diam., scarlet .... 9. *S. trilobatum.*
2. Petioles and pedicels not prickly
*Flowers in racemose cymes. Pedicels 6-8 mm. long. Calyx-teeth triangular. Berry yellow .... 12. *S. albicaule.*
**Flowers in fascicles. Pedicels 2-3.8 cm. long, filiform. Calyx-teeth linear. Berry yellow ...... 10. *S. gracilipes.*

Bark febrifuge; leaves and fruit mucilaginous and bitter, used as resolvents and vulneraries. The herbs are emollient and diuretic.

The following species are used medicinally in Europe—*S. dulcamara* Linn., *S. melongena* Linn., *S. nigrum* Linn., *S. tuberosum* Linn.—; in China—*S. dulcamara* Linn., *S. melongena* Linn., *S. nigrum* Linn.—; in Malaya—*S. dulcamara* Linn.—; in the Philippine Islands —*S. nigrum* Linn.—; in Queensland—*S. chenopodinum* F. Muell.—; in the West Indies—*S. bahamense* Linn.—; in North America—*S. carolinense* Linn., *S. dulcamara* Linn., *S. nigrum* Linn., *S. rostratum* Dun.—; in Mexico—*S. mammosum* Linn.—; in Guiana—*S. botelhianum* Dun., *S. melongena* Linn., *S. nigrum* Linn.—; in Brazil—*S. caavurana* Vell., *S. cernuum* Vell., *S. lycopersicum* Dun., *S. melongena* Linn., *S. nigrum* Linn., *S. paniculatum* Linn., *S. pseudoquina* St. Hil.—; in Chile—*S. crispum* Rz. & P.—; in Madagascar *S. erythracanthum* Boj., *S. indicum* Linn., *S. macrocarpon* Linn., *S. melongena* Linn., *S. nigrum* Linn—; in La Reunion—*S. nigrum* Linn.—; in South Africa—*S. acanthoideum* E. Mey., *S. aculeastrum* Dun., *S. aculeatissimum* Jacq., *S. capense* Linn., *S. giganteum* Jacq., *S. incanum*

Linn., *S. melongena* Linn., *S. nigrum* Linn., *S. panduraeforme* E. Mey., *S. rigescens* Jacq., *S. dodomoeum* Linn., *S. supinum* Dun., *S. tomentosum* Linn.—; in Guinea—*S. nigrum* Linn.—; in the Gold Coast—*S. nigrum* Linn., *S. scalare* E. Elliot—.

OFFICIAL:—The stem of *S. dulcamara* Linn. in Austria, France; the stem and leaves of *S. dulcamara* Linn. (Dulcamara *flexuosa* Moench.) in Portugal.

The flowered plant of *S. nigrum* Linn. in France, *S. nigrum* Linn. (*S. vulgatum* Willd.) in Portugal.

The tubers of *S. tuberosum* Linn. (Belgium, France, Holland, Spain)=*Lycopersicum tuberosum* Mill. (Portugal).

1. **Solanum nigrum** Linn. Sp. Pl. (1753) 186.—*S. rubrum* Mill. Wight Ic. t. 344.—PLATE 670.

A variable annual; stem erect, glabrous or more or less pubescent, much divaricately branched. Leaves numerous, 2.5-9 by 2-5 cm., ovate-lanceolate, subacute or acuminate, glabrous, thin, entire sinuate toothed, tapering into the petiole; petioles 2 cm. long. Flowers small, in extra-axillary subumbellate 3-8-flowered cymes; peduncles 6-20 mm. long, slender; pedicels 6-10 mm. long, very slender. Calyx 3 mm. long, glabrous or nearly so; lobes 5, oblong, obtuse, 1.25 mm. long, not enlarged in fruit. Corolla 4-8 mm. long, divided more than ½-way down into 5 oblong subacute lobes. Filaments short, flattened, hairy at the base; anthers 2.5 mm. long, yellow, oblong, obtuse, notched at the apex. Ovary globose, glabrous; style cylindric, hairy. Berry 6 mm. diam., globose, usually purplish black, but sometimes red or yellow, smooth, shining. Seeds discoid, 1.5 mm. diam., minutely pitted, yellow.

Distribution: Throughout India, Ceylon.—All temperate and tropical regions of the world.

The berries are oleaginous, bitter, pungent, heating; laxative, alterative, aphrodisiac, tonic, diuretic; improve appetite and taste; useful in diseases of the heart and the eye, in pains, piles, inflammation, "tridosh", leucoderma, itch, worms in the ear, dysentery, hiccough, vomiting, asthma, bronchitis, fever, urinary discharges; improve the voice; favour conception and facilitate delivery; useful in erysipelas and rat-bite (Ayurveda).

The root bark is laxative; useful in diseases of the ear, the eye, and the nose; good for ulcers on the neck, burning of the throat, inflammation of the liver, chronic fever, griping; not to be given to pregnant women.—The leaves have a bad odour and a bad taste; used for headache and diseases of the nose.—The fruit is useful in thirst due to fever and in inflammation.—The seeds are laxative; useful in giddiness, gonorrhœa, thirst, and inflammation (Yunani).

In Bengal, the berries are employed in fever, diarrhœa, eye diseases, hydrophobia, etc.

In Bombay, the juice is given in doses of six to eight ounces in the treatment of chronic enlargement of the liver, and is considered a valuable alterative. It acts as a hydragogue, cathartic and diuretic.

The syrup acts as an expectorant and diaphoretic, and is used as a cooling drink in fevers.

In the North-Western Provinces, the juice is used in blood-spitting, piles, dysentery, etc.

Moodeen Sheriff reports having used with advantage a decoction of the leaves of this plant, and also an aqueous extract prepared from it, the latter in drachm doses thrice daily, in the treatment of dropsical affections. Its action is diuretic and laxative.

In the Konkan, the young shoots are given in chronic skin diseases, and used with great success in psoriasis.

The Chinese employ the juice of the leaves to alleviate the pain in inflammation of the kidneys and bladder, and in virulent gonorrhœa.

In Guiana and Madagascar, the plant is given internally for cardialgia, the griping; externally in nephritic colic, corroding ulcer, suppurating chancre, severe burning, and herpes.

In Guinea, a decoction of the leaves is given as a diuretic and depurative.

In South Africa, the plant is used by Europeans for convulsions. The herb is one of the native remedies for local application to anthrax pustules, and a paste of the green berries is applied to ringworm. The Xosas use the plant for disinfecting anthrax infected meat. The

Zulus administer an infusion as an enema to infants with abdominal upsets. The Sutos rub the burnt and powdered root into incisions on the back for the relief of lumbago.

In Rhodesia, the natives use the plant as one of their remedies for malaria, blackwater fever, dysenteries, and other diseases. In older times the juice or a decoction of the herb was made into an ointment for foul ulcers.

The ripe fruit is not toxic in South Africa, and is eaten by the Zulus, Xosas, and Sutos, and by Europeans. Mixed with honey, it is sometimes administered to people suffering from pulmonary tuberculosis.

The fruit in combination with other drugs is prescribed for snake-bite (Charaka, Sushruta) and scorpion-sting (Sushruta); but it is not an antidote to either snake-venom (Mhaskar and Caius) or scorpion-venom (Caius and Mhaskar).

Afrikaans: Galbessie, Nagskaal, Nagskade, Nastergal—; *Arabic:* Ambussalap, Enabeddir—; *Assam:* Pichkati—; *Bengal:* Gurkamai, Kakmachi, Mako, Tulidun—; *Betsimisaraka:* Anantsatria—; *Bicol:* Cuti, Lubilubi—; *Bombay:* Ghati, Kamuni, Mako—; *Brazil:* Carachichu, Erva moira—; *Catalan:* Morella negra, Morella vera—; *Chinese:* Long K'oui, Lung K'uei, T'ien Kui Tse, Tien P'ao Tse—; *Cutch:* Kamperu—; *Danish:* Natskygge, Svineurt—; *Dutch:* Swarte nagtschade—; *English:* Black Nightshade, Common Nightshade, Garden Nightshade, Hound's Berry, Morelle, Petty Morel—; *French:* Bonbon noir, Creuzot, Crève-chien, Herbe ă la gale, Herbe aux magiciens, Herbe maure, Herbe more, Morelle, Morelle commune, Morelle de l'île de France, Morelle des jardins, Morelle molle, Morelle noire, Morette, Mourette, Raisin de loup—; *German:* Alpkraut, Berstelbeere, Garten Nachtschatten, Schwarzer Nachtschatten, Schwarze Nieswurz, Saukraut—; *Greek:* Strychnos, Sychnos—; *Guiana:* Alaman, Laman—; *Gujerati:* Piludi—; *Hasada:* Burudian—; *Hindi:* Gurkamai, Kabaiya, Makoi—; *Hova:* Amelo, Anamafaitra—; *Italian:* Ballerina, Morella, Solano, Solatro—; *Languedoc:* Crebo chin—; *La Reunion:* Brède martin, Brède morelle—; *Loralai:* Karezzi—; *Madagascar:* Anamamy, Hange—; *Malay:* Trong parachichit—; *Malinke:* Bassia bene—; *Malta:* Black

Nightshade, Ballerina, Morella, Gheneb-id-dib, Tuffieh-tas-serp—; *Marathi:* Ghati, Kakmachi, Kamoni, Laghukavali, Meko—; *Mexican:* Tohonechichi—; *Naguri:* Burhidian—; *New Zealand:* Poroporo, Raupeti—; *Persian:* Rubahtareek—; *Philippines:* Hierba mora—; *Polish:* Psinki zele—; *Portuguese:* Herva moura, Solano—; *Punjab:* Kachmach, Kambei, Kwansaf, Mako, Riaungi—; *Pushtu:* Karozgi—; *Roumanian:* Lesnicioara, Umbra noptii—; *Sanskrit:* Bahuphala, Bahutikta, Dhvankshamachi, Ghanaghana, Guchhaphala, Jaghenephala, Kaka, Kakamachi, Kakamata, Kakini, Katuphala, Kushthaghni, Rasayani, Sarvatikta, Sundari, Svadupaka, Tiktika, Vayasavha, Vayasi—; *Sind:* Kanperun—; *Sinhalese:* Kalukanweriya, Kalukungwareiya, Tibbatu—; *Spanish:* Solano negro, Solano oficinal, Yerba mora—; *Swedish:* Hansletegræs—; *Tagalog:* Camacamatisan, Conty, Cunti, Gamagamatisan, Lubilubi, Onti—; *Tamil:* Manattakkali—; *Telugu:* Gajuchettu, Kachi, Kakamachi, Kamanchi, Kanchipundu, Kasaka—; *Urdu:* Makoya—; *Visayan:* Bolagtab, Hulablub, Lagparum—; *Xosa:* Seshoa-behloko, umSobo, umSobosobo—; *Zulu:* umSobo—.

2. **Solanum dulcamara** Linn. Sp. Pl. (1753) 185.—PLATE 671.

A pubescent herb; stems shrubby at the base; branches long, climbing or trailing. Leaves ovate or oblong, 2.5-7.5 cm., long-pointed, entire or sometimes lobed at the base. Flowers purple, 1.3-2 cm., diam., in loose, drooping cymes. Calyx-teeth obtuse Corolla-lobes recurved. Berry 6 mm. diam., red when ripe.

Distribution: From Kashmir to Garhwal, 4,000—8,000 ft., Sikkim, Baluchistan.—Europe, W. and Central Asia, China, Japan.

In India, the berry is considered alterative, diuretic and diaphoretic; it is regarded as useful in constitutional syphilitic affections, chronic rheumatism, and especially so in psoriasis, lepra, and other obstinate skin diseases.

The stems are regarded as antirheumatic in China, and are applied in the form of decoction for carbuncles and boils. In Annam, the root is considered good for skin diseases.

The twigs are narcotic, resolvent, diuretic. They promote all secretions and are used in rheumatism, obstinate cutaneous eruptions, scrofula, etc.

The berries are considered a good substitute for those of *S. nigrum* in chronic enlargement of the liver, as a hydragogue cathartic and diuretic.

In Cambodia, the wood is administered internally in fever. The maceration is used as a wash in conjunctivitis.

Cambodia: Chhœu em—; *Canton:* K'e Kan—; *Catalan:* Dolsamara—; *Chinese:* K'u Ch'ieh, Pai Ying—; *Danish:* Bittersœde—; *Dutch:* Alfsranken, Bittezœt—; *English:* Aw'f'ood, Belladonna, Bittersweet, Bittersweet Nightshade, Blue Bindweed, Deadly Nightshade, Dogwood, Dwale, Fellonwood, Fellonwort, Felon Wood, Felon Wort, Felon Wort Mortal, Mad Dog's Berries, Poison-berry, Poison Flower, Poisonous Tea Plant, Pushion Berry, Robin-in-the-Hedge, Scarlet Berry, Skaw-coo, Snake-berry, Snake's Poison-food, Sweet Bitter, Terrididdle, Terrydivle, Tether Devil, Violet Bloom, Woody Nightshade—; *French:* Bronde, Crève-chien, Courge, Douce-amère, Herbe à la carte, Herbe à lo fièvre, Herbe de Judée, Herbe au violet, Loque, Morelle grimpante, Vigne de Judée, Vigne sauvage, Vigne vierge—; *German:* Alfranken, Alpranke, Buenzkraut, Haidisch, Heidisch, Hindischkraut, Hinschkraut, Hirschkraut, Judendorn, Mæusedorn, Mæuseholtz, Marentaken, Saurebe, Stickwurz, Stockwurz, Suessbitterholz, Suessnachtschatten, Teufelsklatten, Teufelsklauden, Waldnachtschatten, Wasserranke—; *Greek:* Glykypikros—; *Italian:* Amaradolce, Corallini, Dulcamara, Strigio—; *Languedoc:* Belperié—; *Malaya:* Ch'ieh Ken, Khea Kan, Ku ch'ieh—; *Persian:* Anabessalib—; *Portuguese:* Docamarga, Doceamarga, Uva de cao—; *Punjab:* Rubabarik—; *Roumanian:* Cosnisor, Lesnicioara, Vitaorreilor, Zirna—; *Russian:* Paslen sladkogorkyi—; *Spanish:* Dulcamara—.

3. **Solanum spirale** Roxb. Hort. Beng. (1814) 16.—PLATE 672.

An evergreen branched shrub, unarmed, all parts glabrous. Leaves more or less lanceolate to elliptically lanceolate, at the cuneate base decurrent in a shorter or longer (up to 2.5 cm. long)

petiole, 5-10 cm. long, shortly acuminate, entire, membranous, glabrous. Flowers rather small, white, on slender 1.3-2.5 cm. long pedicels forming a leaf-opposed, short-peduncled, slender, lax, glabrous raceme 2.5-5 cm. long. Corolla deeply 5-cleft, the lobes oblong, spreading, about 6 mm. long. Calyx shallowly cup-shaped, about 5 mm. wide, truncate, smooth. Berries globular, supported by the explanate shallowly lobed membranous calyx, the size of a large pea or small cherry, smooth and glossy, yellow. Seeds obliquely ovoid-reniform, compressed, smooth.

Distribution: Assam, Khasia Hills, E. Bengal, Ava.

The root is given in Patna as a narcotic and diuretic (Irvine).
Mundari: Catubili—; *Patna:* Mungas Kajur—; *Sylhet:* Bagua—.

4. **Solanum verbascifolium** Linn. Sp. Pl. (1753) 184; Wight Ic. t. 1398.—PLATE 673.

A shrub or small unarmed tree 1.8-6 m. high, covered almost all over with a dense yellowish or grey tomentum of scurfy stellate hairs. Leaves 10-20 by 5-15 cm., elliptic-lanceolate, acuminate, entire, velvety-pubescent above, densely woolly beneath, base acute or subrhomboid (rarely rounded); main nerves about 8 pairs; petioles 2-3.8 cm. long. Flowers numerous, in woolly dichotomous corymbose cymes which are at first apparently terminal, afterwards becoming lateral; peduncles stout, 2.5-10 cm. long; pedicels 3-10 mm. long, stout, Calyx 6 mm. long, cup-shaped, densely stellately woolly; teeth at flowering time 2.5 mm. long, broadly deltoid, acute, enlarged in fruit but not overtopping the berry. Corolla white, nearly 1.3 cm. long, deeply divided; lobes 8 mm. long, elliptic-lanceolate, acute, stellately hairy outside. Filaments flat, glabrous; anthers 3 mm. long, oblong, obtuse. Ovary hairy; style glabrous. Berry 8 mm. diam., globose, yellow, covered with small stellate hairs. Seeds 1.5 mm. diam., slightly rugose.

Distribution: Throughout India in the tropical and subtropical zone, Ceylon.—Malaya, N. Australia, tropical America.

The dried plant is ground with warm water and applied externally to lessen inflammation, burning sensation, and pain; very good for burns (Yunani).

Arabic: Jaleed—; *Canarese:* Kadusonde, Kallarthi, Savudangi, Sonde—; *Cebu:* Noognoog—; *Central Provinces:* Chichora—; *Dehra Dun:* Bantamaku—; *Garhwal:* Asedu—; *Kumaon:* Asedu, Ashetu, Bantamakhu—; *Lepcha:* Sivor—; *Malay:* Sakasap—; *Malayalam:* Chunta, Erichunta, Malanjunta—; *Marathi:* Kutri—; *Mundari:* Bondu—; *Nepal:* Burbee, Dursul—; *North-Western Provinces:* Asheta—; *Persian:* Tagarag—; *Punjab:* Kalamewa, Kharawine, Ola, Tiari—; *Sanskrit:* Gandira, Pathi, Priyamkari, Vidari—; *Saora:* Pittu—; *Sinhalese:* Hekarilla—; *Tamil:* Anaichundai, Malaichundai, Sundai—; *Telugu:* Budama, Rasagadi—; *Urdu:* Ola—; *Visayan:* Tabacotabacohan, Ungali—.

5. **Solanum ferox** Linn. Sp. Pl. ed. 2 (1762) 267; Wight Ic. t. 1399.—PLATE 674.

Stem herbaceous, stout, 0.6-1.2 m. high, densely clothed with long coarse, often stalked, usually fulvous stellate hairs, and copiously armed with straight slender prickles. Leaves usually 2 at a node and unequal, 15-28 by 10-20 cm., broadly elliptic in outline, sinuately or pinnately cut into few short triangular lobes, softly stellately fulvous-hairy on both sides (very densely so beneath), armed with long erect yellow slender prickles on the nerves on both sides, base cordate, truncate, or more or less acute, often unequal-sided; main nerves 6-8 pairs; petioles 3.8-6.3 cm. long, prickly and densely fulvous-hairy. Flowers solitary or in 2-6-flowered leaf-opposed densely hairy cymes; peduncles very short; pedicels 6-13 mm. long, densely stellately fulvous-hairy and usually with a few prickles. Calyx campanulate, 1 cm. long, divided about ½-way down, densely stellately fulvous-hairy, slightly enlarged in fruit; teeth deltoid, acute. Corolla 2 cm. long, 5-partite; tube very short, 1.5 mm. long; lobes ovate-lanceolate, acute, densely hairy outside. Anthers sessile or nearly so, linear-lanceolate, 8 mm. long, opening by small pores. Ovary densely hairy with long hairs; style glabrous. Berry globose, 2-3.2 cm. diam.; densely covered with long fulvous hairs. Seeds 2.5 mm. diam., faintly rugose with concentric rings.

Distribution: Assam, Burma, Konkan, S. W. Country, W. Ghats of Madras Presidency, Ceylon.—China.

The root and berries are pungent and heating; improve appetite and taste; sedative to the gravid uterus; cure "vata" and "kapha"; good for ophthalmia; in general their medicinal properties are much the same as those of *S. xanthocarpum* (Ayurveda).

A decoction of the entire plant was administered to cases of different varieties of fevers; the drug was not found to possess any diaphoretic or antipyretic action (Koman).

Bengal: Rambegun—; *Burma:* Sinkade, Sinkadi, Sinkayan—; *Canarese:* Biligulla, Gulla, Mulluchundekayi—; *Malayalam:* Anachchunta, Vellottuvalutina—; *Sanskrit:* Chandrapushpa, Chandri, Chandrika, Garbhada, Gardabhi, Kshetraduti, Lakshmana, Mahaushadi, Nakuli, Nisnehapushpa, Rama, Sitakanta, Svetakantakari—; *Sinhalese:* Malabatu, Mallakattu—; *Tagalog:* Talonggubat, Tarambolo—; *Tamil:* Anaichundai—; *Telugu:* Mulaka—; *Tulu:* Gullabadane—; *Uriya:* Ramobaigono—; *Visayan:* Tagutong—.

6. **Solanum indicum** Linn. Sp. Pl. (1753) 187; Wight Ic. t. 346.—PLATE 675.

A much-branched undershrub 0.3-1.5 m. high, very prickly; prickles large, with a long compressed base, sharp, often slightly recurved; stem stout, often purple; branches covered with minute stellate hairs. Leaves 5-15 by 2.5-7.5 cm., ovate in outline, acute, subentire or with a few large triangular-ovate subacute lobes, sparsely prickly on both sides, clothed above with simple hairs from bulbous bases intermixed with small stellate ones, covered below with small stellate hairs; base cordate, cuneate or truncate, often unequal-sided; petioles 1.3-2.5 cm. long, prickly. Flowers in racemose extra-axillary cymes; peduncles short; pedicels 6-13 mm. long, stellately hairy and prickly. Calyx 3 mm. long, stellately hairy; teeth triangular, 1.5 mm. long. Corolla 8 mm. long, pale purple, clothed outside with darker purple stellate hairs; lobes 5 mm. long, deltoid-ovate, acute. Filaments very short, almost 0; anthers oblong-lanceolate, opening by small pores. Ovary often hairy at the top; style stellately hairy, curved at the apex. Berry 8 mm. diam., globose, dark yellow when ripe, glabrous or sometimes with a few stellate hairs at the apex. Seeds 4 mm. diam., minutely pitted.

Distribution: Throughout tropical India, Ceylon.—Malaya, China, Philippines.

The root is pungent, bitter, heating; digestive, astringent to the bowels, anthelmintic; removes foulness of the mouth; beneficial in cardiac troubles; useful in leucoderma, fever, asthma, pain, bronchitis, vomiting, pruritus ani.—The fruit is bitter, pungent; anthelmintic; useful in pruritus, leucoderma, bronchitis, " vata ", " kapha ", asthma, fever, vomiting, loss of appetite, diseases of the eye (Ayurveda, Yunani).

The root taken internally manifests strongly exciting qualities. It is employed in difficult parturition and in toothache. It is also used in fevers, worm complaints, and colic. It is regarded as expectorant and useful in cough and catarrhal affections. It is prescribed in cases of dysuria and inchuria, in the quantity of half a tea-cupful twice daily.

The juice of the leaves, with fresh juice of the ginger, is administered to stop vomiting. The leaves and fruit, rubbed up with sugar are used as an external application to itch.

In Madagascar, the plant is considered stomachic, and antipyretic; the fruit is used as a bitter stomachic, antineurasthenic, and hypnotic.

A decoction of the root of this plant was given to cases of bronchitis attended with fever; the result was unsatisfactory (Koman).

The root and the fruit are prescribed in snake-bite (Charaka, Sushruta, Vagbhata, Yogaratnakara, Rasaratnakara) and scorpion-sting (Charaka, Sushruta, Vagbhata).

Neither the root nor the fruit is an antidote to snake-venom. The root is useless as an errhine or as an external application to the part bitten in the treatment of snake-bite (Mhaskar and Caius).

Neither the root nor the fruit is an antidate to scorpion-venom (Caius and Mhaskar).

Assam: Tidbaghuri—; *Bengal:* Bagaun, Byakur, Byakura, Gurkamai, Titbaigum, Titveguna—; *Betsileo:* Roingivy, Voapo—; *Betsimisaraka:* Ankivy—; *Bombay:* Dorli, Motiringi, Ringani—; *Canarese:* Badane, Gulla, Habbagulla, Kachi, Kadusonde, Kamanja, Kempugulla, Kirigulla, Sonde, Vayase—; *Central Provinces:*

Ringli—; *Chinese:* Houang K'iue—; *Gujerati:* Mhotiringni, Motaringni, Ubhibhoringni, Vadaringni—; *Hindi:* Barhanta, Barhata, Bhatakataiya, Bhutkataiya, Birhatta, Kattarha, Vadikadheri—; *Hova:* Angivibe, Angivy, Hery, Voangivy, Voampo, Voampoa—; *Kumaon:* Banbhatta—; *La Reunion:* Bringellier marron—; *Las Bela:* Didi—; *Lepcha:* Kadombee—; *Malayalam:* Cheruchunta, Cheruvalutina, Chunta, Nilavalutina—; *Marathi:* Dorli, Ranrigni, Thorlidorli—; *Mundari:* Hanjeddaru, Huringhanjeddaru—; *Nepal:* Bihi—; *North-Western Provinces:* Katangkari—; *Pab:* Bahar—; *Persian:* Badengawejangali, Ustargar—; *Punjab:* Kandyari—; *Sanskrit:* Akranta, Alpaphala, Asprasi, Bahupatri, Bhantaki, Brahati, Brihatika, Dovadi, Dusparsa, Hinguli, Kantakarika, Kantakini, Kanthalu, Kanthatanu, Katphala, Kranta, Kshudrabhanta, Kshudrabhantaki, Kshudravartaki, Kuli, Lata, Mahati, Mahatikranta, Mahotika, Paravedi, Prasaha, Raktapaki, Rashtrika, Sinhi, Sinhika, Sthulabhandaki, Sthulakantha, Torani, Vanavrintaki, Vartaki, Vyaghri—; *Sinhalese:* Tibbatu—; *Tamil:* Kandal, Karimulli, Kuttuchadikkandangattarai, Mulli, Naymulli, Mundagam, Papparamulli, Siruvaludalai, Siruvaludunai, Valudalai, Varttagi, Vattu, Uruvi—; *Telugu:* Adaviyuchinta, Chittimulaga, Challamulaga, Kakimachi, Nallamulaka, Tellamulaka—; *Tulu:* Kallante—; *Urdu:* Janglibringan—; *Uriya:* Bryhoti, Bonobryhoti, Nunnuniyakoli—; *Wad:* Bhar—.

7. **Solanum melongena** Linn. Sp. Pl. (1753) 186.—Plate 676.

Erect herbaceous, closely covered with short prinkles or, in some cultivated forms, completely unarmed. Young parts closely tomentose. Leaves large elliptic 10-18 cm. subentire, sinuate or shallowly lobed with rounded lobes. Flowers solitary or several in a cyme with the lowest only fertile, or in the wild plant all fertile, about 2.5 cm. diam. Calyx 1.3-2 cm. long in flower with elliptic or oblong or lanceolate lobes without very broad sinuses between, accrescent in fruit. Berry glabrous white yellow or dark purple, 2.5 cm. or often of great size in cultivation.

Distribution: Widely cultivated in India.—Native country not exactly known.

The unripe fruit is bitter, pungent, heating, sweetish, saltish, tasty; improves appetite, aphrodisiac, cardiotonic; enriches the blood; beneficial in "vata" and "kapha"; increases asthma and bronchitis, but does not cause biliousness.—The ripe fruit causes biliousness, but improves the blood (Ayurveda).

The root is applied to lessen pain.—The fruit is tasteless; cardiotonic, laxative, analgesic, maturant; lessens inflammation; bad for piles if taken internally, but beneficial if applied externally (Yunani).

The leaves are used as a narcotic.

The seeds are used as a stimulant, but they are apt to lead to dyspepsia and constipation.

The leaves and fruits are used medicinally in Madagascar. They are considered sialagogue, odontalgic, and antiherpetic. They are also commonly used in cholera, bronchitis, fever, dysuria, and asthma.

In Guiana, the juice of the roots is instilled in otitis and odontalgia.

The Xosas of South Africa drink a decoction of the root in the treatment of syphilis, and apply a paste of the leaf to the external manifestations.

Ada: Agbitsha—; *Arabic:* Badangan, Badanjan, Badinjan, Kahkab, Kahkam—; *Ashanti:* Atoropo, Guan hwowa—; *Assam:* Jatibengani—; *Awuna:* Agbitsa—; *Bengal:* Bartaku, Begun, Bong, Kulibegun, Hinpoli, Mahoti—; *Betsileo:* Roingivy—; *Betsimisaraka:* Bana: Baranjehy, Voabana—; *Bombay:* Baigana, Bengan, Vange, Waingi—; *Burma:* Kayan, Khayan—; *Canarese:* Badane, Bhandaki, Bhantaki, Gulla, Kachi—; *Catalan:* Albergenia—; *Central Provinces:* Banbhata—; *Chinese:* Ch'ieh—; *Deccan:* Wangi—; *English:* Brinjal, Egg-plant—; *Ewe:* Agbitsa—; *Fanti:* Ntropo, Ntrorba—; *French:* Albergaine, Albergine, Ambergine, Aubergine, Bélingèle, Bélingène, Béringène, Brehême, Bringelle, Marigman, Magenne, Mélanzane, Mélongène, Mérangène, Mérinjaune, Oeuf végétal, Pondeuse, Poule qui pond, Varengeane, Véringeane—; *French Guiana:* Aubergine—; *Ga:* Atorokpo, Sairbair—; *German:* Eierapfel—; *Gold Coast:* Egg Plant, Garden Egg—; *Gujerati:* Rigana, Ringni, Vantak, Vengni—;

Hasada: Bengara, Benggara—; *Hausa:* Data, Dwata, Kulufita, Yalo—; *Hindi:* Badanjan, Baingan, Baigun, Bangan, Bhanta, Brinjal—; *Hova:* Angivinbazaha, Angivy, Baranjely, Hery, Toraraka, Toreraka, Voangivy—; *Italian:* Mela insana, Melangola, Melanzana—; *Kashmir:* Badanjanbostani, Tukmibadanjanrumi—; *Konkani:* Vaingim—; *Krepi:* Susruba, Te—; *Kumaon:* Baigan, Bhutta—; *Kyerepon:* Ekpu—; *Languedoc:* Aoubergino, Aoubespi, Aoubrespi, Viédase—; *La Reunion:* Bringelle—; *Malayalam:* Hinguli, Kattiri, Mulakutakkali, Nilavalutina, Valutina—; *Marathi:* Vangi—; *Mundari:* Bengara, Karkartoko, Toko—; *Naguri:* Toko—; *North-Western Provinces:* Bhanta, Brinjal—; *Persian:* Badanjan, Badenigan, Badingan—; *Portuguese:* Beringela, Beringeleira—; *Punjab:* Bengan—; *Roumanian:* Patragea vinata—; *Russian:* Bieshenaya yagoda—; *Sakalave:* Boraraka—; *Sanskrit:* Angana, Bera, Bhantaki, Chitraphala, Dirghavartaki, Dushpradharshini, Hinguli, Kantakini, Kantalu, Kantapatrika, Kantavartaki, Katphala, Kuli, Mahahrihati, Mahati, Mahotika, Mansalaphala, Mishravarnaphala, Nidralu, Nilakantaka, Nilaphala, Nilavriksha, Nripapriyaphala, Pitaphala, Rajakushmanda, Raktphala, Shakabilva, Shakabilvaka, Shakashreshtha, Sinhi, Vangana, Varta, Vartaka, Vartaki, Vatigama, Vrintaki, Vrittaphala—; *Sind:* Wangan—; *Sinhalese:* Wàmbatu—; *Spanish:* Alberengena, Berengena, Melongena—; *Suto:* Thola—; *Tagalog:* Talong—; *Tamil:* Achatti, Kaliliyam, Karkkattari, Kattari, Koyambattai, Milaguttakkali, Mullukkattari, Pandagi, Piragadi, Valudalai, Valudunai, Vangam, Varttagam—; *Telugu:* Chiruvanga, Hingudi, Eruvanga, Mettavanga, Mulaka, Nidupuvanga, Nirettuvanga, Niruvanga, Vanga, Vangamu, Vankaya—; *Tulu:* Badane—; *Twi:* Atoropo, Nnuadewa, Nnuahwair, Ntorrowa—; *Uraon:* Bhetangga—; *Urdu:* Baingan—; *Uriya:* Baigonia, Barttakki, Begunia—; *Visayan:* Talong—; *Xosa:* umThuma—.

8. **Solanum xanthocarpum** Schrad. & Wendl. Sert. I (1795) 8, t. 2.—Plate 677A.

A very prickly diffuse bright-green perennial herb, somewhat woody at the base; stem somewhat zigzag; branches numerous, the younger ones clothed with dense stellate tomentum; prickles compressed, straight, yellow, glabrous and shining, often exceeding 1.3

cm. long. Leaves 5-10 by 2.5-5.7 cm., ovate or elliptic, sinuate or subpinnatifid, obtuse or subacute, stellately hairy on both sides (especially so beneath), sometimes becoming nearly glabrous in age, armed on the midrib and often on the nerves with long yellow sharp prickles, base usually rounded and unequal-sided; petioles 1.3-2.5 cm. long, stellately hairy and prickly. Flowers in extra-axillary few-flowered cymes sometimes reduced to a single flower; peduncles short; pedicels short, curved, stellately hairy. Calyx nearly 1.3 cm. long, densely hairy and prickly; tube short, globose; lobes 11 mm. long, linear-lanceolate, acute, prickly outside. Corolla purple, 2 cm. long; lobes deltoid, acute, hairy outside. Filaments 1.5 mm. long, glabrous; anthers 8 mm. long, oblong-lanceolate, opening by small pores. Ovary ovoid, glabrous; style glabrous. Berry 1.3-2 cm. diam., yellow, or white with green veins, surrounded by the enlarged calyx. Seeds 2.5 mm. diam., glabrous.

Distribution: Throughout India, Ceylon.—S.-E. Asia, Malaya, tropical Australia and Polynessia.

The root is pungent, bitter, heating; appetiser, laxative, stomachic, anthelmintic; useful in bronchitis, asthma, fever, " vata ", and " kapha ", ozæna, strangury, lumbago, pains, piles, thirst, urinary concretions, and diseases of the heart.—The fruit is bitter, digestible; improves the appetite; good in diseases of the heart, pruritus, asthma, fever; anthelmintic, anaphrodisiac; causes biliousness (Ayurveda).

The root is an aphrodisiac.—The leaves are a good application for piles.—The fruit has a bitter bad taste; laxative; good in inflammations, chronic bronchitis, asthma, biliousness, fevers, muscular pains, dysuria, stone in the bladder, sterility in women. —The seeds are anthelmintic; good for boils, scabies, asthma, and cough (Yunani).

The root is much esteemed as an expectorant, and is used in cough, asthma, catarrhal fever and pain in the chest. Kantikari is used in medicine in various forms, such as decoction, electuary, ghrita, etc. A decoction of the root is given with the addition of long pepper and honey, in cough and catarrh, and with rock salt and assafœtida in spasmodic cough.

The roots beaten up and mixed up with wine are given to check vomiting. The juice of the berry is also useful in sore throat.

The stems, flowers and fruit are bitter and carminative, and are prescribed in those forms of the burning of the feet (*Ignipeditis*) which are attended with a vesicular, watery eruption. Fumigations with the vapour of the burning seeds of this plant are in high repute in the cure of toothache. It acts as a powerful sialogogue, and by this means probably relief is obtained.

In the Konkan, 2 tolas of the juice of the fresh plant, with 2 tolas of *Hemidesmus* juice, are given in whey as diuretic, and the root with chiretta and ginger is given in decoction as a febrifuge.

In Bengal, the plant is much used as a diuretic in dropsy.

In the Punjab hills, the expressed juice of the leaves is given with black pepper, in rheumatism. The leaves are also applied locally, to relieve pain (B. D. Basu). A decoction of the plant is used in cases of gonorrhœa.

The bud and flower, with salt (solution) good for watery eyes (Wood).

At Bolan, in Baluchistan, the plant is considered a cure for fever in children by washing them with a decoction of the leaves (Hughes-Buller).

The root, in combination with other drugs, is prescribed for the treatment of snake-bite (Vagbhata, Yogaratnakara). It is not an antidote to snake-venom (Mhaskar and Caius).

Kanga has isolated so-called active principles from the fruit and from the whole plant (18th Ind. Sc. Congress; Nagpur, 1931)

Arabic: Badanjankare—; *Bengal:* Kantakari—; *Bolan* Bandanshan—; *Bombay:* Bhuringni, Ringni—; *Canarese:* Chikkasonde, Kantakari, Kante, Nelagulla, Ramagulla—; *Central Provinces:* Ringni—; *Ceylon:* Vaddu—; *Deccan:* Ringni—; *Gujerati:* Bhoyaringani, Bodiringni—; *Hindi:* Katai, Kataikhuadda, Kateli, Ringni, Satyanasi—; *Las Bela:* Didki—; *Malayalam:* Kantakarichunta, Kantankattiri, Puttachunta—; *Marathi:* Bhonyaringani, Bhuiringani, Kanteringani—; *Pab Hills:* Pinaz—; *Patna:* Khatkhatayi,

Rengnie—; *Persian:* Badanaganedashti—; *Porebunder:* Bhoringni, Padharingni—; *Punjab:* Batkateya, Chotimauhari, Kandiari, Katela, Harnaali, Kharianmaraghune, Mahovi, Mamoli, Pilak, Warumba—; *Sanskrit:* Anakranta, Bahukanta, Bahukantaka, Bahuphala, Bhantaki, Brihati, Chitraphala, Dhavani, Dhavanika, Dushpradharshini, Dusparsha, Kantakari, Kantakarika, Kantakini, Kantalika, Kantashreni, Kasaghni, Kshetraja, Kshudra, Kshudrakantika, Kshudraphala, Kshurika, Kuli, Nidigdhika, Pitatandula, Prachodini, Putrapada, Rashtrika, Sarpatanu, Sinhi, Sprihi, Vyaghri—; *Santal:* Rangainijanum—; *Saora:* Vuste—; *Sind:* Aderayjadenay—; *Sinhalese:* Ellabattu, Kattuvelbattu—; *Tamil:* Kandangattari, Sutturam, Udaravani, Udavani—; *Telugu:* Challamulaga, Jidduvuste, Nelamulaka, Nelavakudu, Pinnamulaka, Tellanelamulaka, Tellavakudu, Vakudu, Vartaki—; *Tulu:* Gulla, Kallante—; *Urdu:* Bhakkatiya, Katilla—; *Uriya:* Bryhotibegonia, Chokrobryhoti, Kontna, Onkoranti—.

9. **Solanum trilobatum** Linn. Sp. Pl. (1753) 188; Wight Ic. t. 854.—Plate 678.

An undershrub 1.8-3.6 m. long, trailing or subscandent by its numerous hooked prickles; stems slender; branches long, divaricate, the young ones sometimes with a few stellate hairs, the older glabrous; prickles from a broad triangular base, very sharp, compressed, hooked, decurved. Leaves 2.5-5 by 2-3.8 cm., ovate or rotund-ovate, obtuse, irregularly sinuate or 3-5-lobed, sparsely stellately hairy or glabrous, with or without 2 or 3 prickles on the midrib, base not cordate; petioles 1.3-3.8 cm. long, prickly. Flowers large and showy, violet-purple, in extra-axillary racemose cymes; peduncles very short, almost 0; pedicels 1.3-2.5 cm. long, often prickly. Calyx cyathiform, 3-4 mm. long, stellately hairy; teeth 1.25 mm. long, triangular, acute. Corolla exceeding 1.3 cm. long; tube 2 mm. long; lobes oblong-lanceolate, acute, stellately hairy outside, usually reflexed. Filaments 1.25 mm. long; anthers 8 mm. long, narrowly oblong, opening by small pores. Ovary ovoid or subglobose, glabrous; style glabrous. Berry 6-8 mm. diam., scarlet when ripe. Seeds 3 mm. diam., slightly pitted.

Distribution: Gujarat, Deccan, S. M. Country, N. Circars, Carnatic, Ceylon, Malay Peninsula.

The root and leaves are bitter and prescribed in consumptive cases in the form of electuary, decoction and powder. The berries and flowers are given in cough.

A decoction of the entire plant 1 in 10 was administered to cases of acute and chronic bronchitis and was found to be useful in those diseases. This is considered to be a home remedy for all kinds of cough (Koman).

Canarese: Ambusondeballi, Kakamunji, Mullumusta—; *Malayalam:* Tutavalam—; *Sanskrit:* Achuda, Alarka—; *Sinhalese:* Waltibattu—; *Tamil:* Kudalam, Nittidam, Sandunayattan, Surai, Tudi, Tudulai, Tuduvalai—; *Telugu:* Alarkapatramu, Kondavuchinta, Mundlamuste, Tellavuste, Uchinta, Uste—; *Uriya:* Bryhoti—.

10. **Solanum gracilipes** Dcne. in Jacquem. Voy. Bot. (1844) 113, t. 119.—Plate 677B.

An undershrub with slender branches; stems stellately ashy-tomentose; branches terete, sparingly prickly; prickly small, sharp, straight or recurved, not compressed, tomentose at the base. Leaves small, rotund-ovate, obtuse, 2-3.8 cm. long and nearly as broad as long, minutely stellately hairy on both sides, sometimes subglabrous, base subcordate, truncate, or cuneate; main nerves 3-4 pairs; petioles slender, 2-3.2 cm. long, stellately tomentose, not prickly. Flowers in extra-axillary or subaxillary few-flowered fascicles sometimes reduced to a single flower; pedicels filiform, 2-3.8 cm. long, stellately tomentose, not prickly. Calyx 5 mm. long, stellately pubescent; lobes as long as the tube, linear from a triangular base and with a broad sinus between, elongating in fruit. Corolla 1 cm. long; lobes 6 mm. long, triangular-ovate, acute, stellately pubescent outside, reticulately veined. Filaments very short, almost 0; anthers 6 mm. long, linear-oblong, opening by small pores. Ovary globose-ovoid, glabrous or with a few stellate hairs at its apex; style glabrous. Berry 6 mm. diam., Globose, glabrous. Seeds 3 mm. diam., minutely tuberculate.

Distribution: Punjab, Sind, Baluchistan.—Arabia, Socotra.

The juice of the fruits and of the leaves is applied to otitis.

Pab Hills: Pitiawal—; *Punjab:* Halun, Howa, Gagra, Gakra, Kandiari, Kauributi, Marghipal, Patiawaladama, Pilak, Valur—.

11. **Solanum torvum** Swartz. Prodr. Descr. Veg. (1788) 17.

A tomentose shrub 1.5-3 m. high, in many respects very similar to S. indicum but usually taller and more erect with fewer more erect branches. Leaves without prickles or with one only beneath near the base of midrib. Cymes often bifurcate and denser and flowers always white. calyx never armed. Fruit 1.3 cm. seated on the calyx which is 9-10 mm. diam. with lanceolate lobes.

Distribution: Throughout India in the tropical region except the W. Desert area.—Malaya, China, Philippines, tropical America.

The fruits are eaten as a vegetable and said to be good for enlargement of the spleen (Carter).

Assam: Hathibhekuri—; *Bengal:* Titbaigum—; *Burma:* Kayangyin—; *Canarese:* Bovasonde, Kadubadam, Kadusonde, Sonde—; *Malay:* Trong mangas, Trong mangon, Trong pipet, Trong rajah wang, Trong rumbang—; *Malayalam:* Chunta, Kattuchunta—; *Mundari:* Hanjeddaru, Maranghanjed—; *Nepal:* Barabihi—; *Tamil:* Kottukkattari, Malaichundai, Sundai—; *Telugu:* Kondavuste—; *Tulu:* Katukallante—.

12. **Solanum albicaule** Kotschy ex Dunal in DC. Prodr. XIII, pt. 1 (1852) 204.

A very prickly undershrub; stem woody, 30 cm. and more high; branches elongate, terete, and, as well as the leaves beneath, petioles, peduncles, pedicels, calyx and corolla (outside) hoary with stellate tomentum; prickles numerous, compressed or sometimes conical, very sharp and recurved at the apex from a broad base, usually tomentose in the basal part. Leaves solitary or the upper twin, one of the pair shorter than the other, 2-3.8 by 1.6-2.5 cm., variable in shape, ovate-oblong or subpanduriform, acute or obtuse, entire or slightly lobate, softly hairy above, white with dense stellate tomentum beneath, base subcordate; main nerves 2-4 pairs; petioles 6-20 mm. long, rarely prickly. Flowers in racemose cymes; peduncles short; pedicels 6-8 mm. long, usually unarmed. Calyx densely woolly-tomentose,

4-5 mm. long, cyathiform; lobes equalling the tube, triangular, acute. Corolla purple, stellately pubescent outside; tube very short, 1.5 mm. long; lobes nearly 1.3 cm. long, lanceolate-oblong, acute, with a strong midnerve. Filaments very short, almost 0; anthers narrowly oblong-lanceolate, 6 mm. long, opening by small pores. Ovary glabrous; style glabrous, curved at the top. Berry 4-6 mm. diam., globose, glabrous, yellow. Seeds 3 mm. diam., subreniform, slightly tuberculate.

Distribution: Sind, Rajputana Desert.—Arabia, tropical Africa.

In the Rajputana Desert, the water in which the crushed plant has been boiled is taken against ulcers (Blatter and Hallberg).

Tigré: Angelle, Angilla, Marmaru, M'arumaro, Ongelle—.

13. **Solanum incanum** Linn. Sp. Pl. (1753) 188.

A branched prickly shrub, densely clothed with soft stellate pale fulvous hairs; prickles stout, very sharp, recurved, yellow, shining above, usually tomentose at the broad base. Leaves 7.5-11.5 by 4.5-7.5 cm., ovate-elliptic, subacute, sinuately lobed, velvety above with stellate fuscous hairs, densely fuscous-woolly below, sparsely prickly along the midnerve on both sides, rarely so on the lateral nerves, base subcordate or truncate, rarely cuneate; main nerves about 6 pairs; petioles 2-3.8 cm. long, prickly. Peduncles lateral, usually paired, one bearing a solitary fertile flower, the other bearing a racemose cyme of male flowers. Calyx cup-shaped, densely stellately woolly, prickly in the fertile, usually not prickly in the sterile flowers, 8 mm. long, divided less than half-way down; lobes triangular acute. Corolla pale purple, nearly 2 cm. long; lobes 8 mm. long, ovate, acute, stellately hairy on both sides, densely so on the outside, the interspaces between the hairy bands tender, glabrous. Filaments 1.25 mm. long, flattened, glabrous; anthers 8 mm. long, narrowly oblong, opening by small pores. Ovary globose, hairy at the apex; style hairy below. Berry 2-2.5 cm. long, ovoid or subglobose, yellow. Seeds 2.5 mm. diam., minutely pitted.

Distribution: Sind, Punjab, W. Peninsula.—S.-W. Asia, Arabia, Egypt, tropical and S. Africa.

The root is said to be used as a medicine for horses (Hotson).

In South Africa, the plant is used by the Sutos as a remedy for toothache and sore throat. The Pedis take a decoction of the plant for chest troubles, and parts of the plant, roasted, for pleurisy and pneumonia.

The juice of the fruit enters into the composition of an arrow poison used by the Bushmen and possibly also by the Hottentots.

Brahui: Kauratrim—; *Pedi:* Morola—; *South Africa:* Bitter Apple—; *Suto:* Thola—; *Tigrinia:* Angulai, Angulle, Ungulleh—.

Physalis Linn.

Annual or perennial herbs. Leaves alternate, entire, sinuate or rarely pinnatifid. Flowers usually small, axillary, solitary pedicellate. Calyx campanulate, 5-fid, much accrescent in fruit, then inflated, membranous, loosely enclosing the berry; teeth small, connivent. Corolla campanulate, greenish or lurid yellow, sometimes with purple spots below. Stamens 5, attached near the base of the corolla; anthers usually shorter than the filaments, dehiscing longitudinally. Ovary 2-celled; ovules numerous; style filiform; stigma obscurely 2-lobed. Berry globose, enveloped in the bladder-like calyx. Seeds many or few, smooth or faintly tuberculate, compressed; embryo peripheric.—Species 50.—Cosmopolitan.

1. Corolla clear yellow .... 1. *P. minima.*
2. Corolla with 5 large purple spots near the base within .... 4. *P. peruviana.*
3. Flowers pale yellowish. Fruiting-calyx oblong-ovoid .... 3. *P. angulata.*

Narcotic and diuretic properties define the genus therapeutically.

The following species are used medicinally in Europe and China—*P. alkekengi* Linn.—; in North America—*P. viscosa* Linn.—; in Brazil—*P. angulata* Linn., *P. pubescens* Linn., *P. viscosa* Linn.—; in Guiana—*P. pubescens* Linn.—; in La Reunion—*P. angulata* Linn., *P. peruviana* Linn.—; in Gambia and the Gold Coast—*P. angulata* Linn.—; in South Africa—*P. peruviana* Linn.—.

The fruit of *P. Alkekengi* is official in France.

1. **Physalis minima** Linn. Sp. Pl. (1753) 183.—Plate 679B.

Annual herbaceous; stem erect, 15-30 cm. high, striate, more or less (often viscidly) pubescent. Leaves 2.5-6.3 by 1.3-3.8 cm.,

ovate, acute, shallowly toothed or lobed, more or less pubescent, thin, base cuneate; petioles 1.3-3.2 cm. long, slender more or less pubescent. Flowers solitary; pedicels filiform, nodding, 3-8 mm. long. Calyx 3-5 mm. long at flowering time, not angular, base truncate; teeth triangular, acute, nearly equalling the tube, ciliate. Corolla clear yellow, sometimes spotted at the base within; lobes of the limb very short. Filaments 2.5 mm. long, glabrous; anthers 2 mm. long, oblong, obtuse. Ovary ovoid, seated on a large disk; style glabrous. Berry 8 mm. diam., entirely enveloped in the enlarged calyx, which is ovoid or subglobose, 1.3-2.5 cm. long, membranous, 5- or sometimes 10- ribbed, reticulately veined, tipped by the connivent pubescent calyx-teeth. Seeds discoid or subreniform, 2 mm. diam., finely muriculate, orange-yellow.

Distribution: More or less throughout India, Baluchistan, Ceylon.—Afghanistan, tropical Africa and Australia.

The plant is a bitter and appetiser; tonic, diuretic, laxative; useful in inflammations, enlargement of the spleen, ascites, and abdominal troubles (Ayurveda).

The fruit is considered tonic, diuretic, and purgative, in the Punjab. Used for horses and gonorrhœa in the Gujarat district of the Punjab.

In the Konkan, the plant is made into a paste with rice water and applied to restore flaccid breasts, in accordance with the doctrine of signatures.

The Mundas of Chota Nagpur use the juice of the leaves, mixed with water and mustard oil, as a remedy against earache. After injecting some drops of this mixture they plug the ear with cotton-wool.

Awuna: Gbatogbato—; *Bengal:* Bantepariya—; *Bombay:* Nanvachivel, Thanmori—; *Ewe:* Gbagbadenggoc, Gbatogbato, Tsorfonggome—; *Ga:* Toto—; *Gujerati:* Parpoti—; *Hasada:* Hariputki—; *Hindi:* Bandapariya, Chirpoti, Tulatipati—; *Madras:* Takkali—; *Marathi:* Chirboti, Dhanmori, Kapparphodi, Lahanpopti, Phopeti—; *Mundari:* Catudiang, Cutubode, Cutuborej, Diang—; *Porebunder:* Jhinkipopati—; *Punjab:* Habbikaknaj, Kaknaj—;

Sanskrit: Chirapotha, Tankari—; *Santal:* Handikhandi—; *Sinhalese:* Hinmottu, Mottu—; *Telugu:* Kupanti—; *Twi:* Tootoo—.

2. **Physalis minima** Linn. var. **indica** C. B. Clarke in Hook. f. Fl. Brit. Ind. IV, 238.

Glabrescent; fruiting calyx 5-angular.

Distribution: Throughout India.

It is considered to be tonic, diuretic and purgative, and is an ingredient in a medicinal oil which is given for spleen.

Marathi: Chirboti, Chirbutti, Kapparphodi, Phopetie—; *Sanskrit:* Lakshmipriya—.

3. **Physalis angulata** Linn. Sp. Pl. (1753) 183.

An erect, branched, glabrous herb 1 m. high or usually less, the stems angled. Leaves ovate-oblong, 5-9 cm. long, acute or acuminate, base usually acute, often somewhat inequilateral, entire or somewhat repand-toothed. Flowers pale yellowish, about 6 mm. long. Fruiting calyx oblong-ovoid, 2.5-3 cm. long, the fruits about 1 cm. diam.

Distribution: Tropical America.—Cultivated in Indian gardens.

The plant is used as a diuretic in La Reunion.

In the Gold Coast, the plant is mashed and put in palm wine which is then drunk to cure fever. The leaves are used to cure stomach trouble. The juice from the leaves is sometimes squeezed into the eyes and nose of a fainting child in order to restore it.

Among the Ashantis, the leaves are ground up with white clay and made into a paste. Water and peppers are then added, and the resulting solution is used as an enema, generally by women who have abdominal pains. The same leaves ground up with tallow forming a paste are used by women to insert into the vagina for vaginal pains.

Ashanti: Tortortortor, Tutotuto—; *Awuna:* Gbato—; *Chinese:* Pai Chiang—; *Ewe:* Wotowoto—; *Fanti:* Nsunsu, Totortotor—; *Ga:* Toto—; *Hausa:* Mailalita, Matsarmama—; *La Reunion:* Petit pocpoc—; *Philippines:* Camates—; *Tagalog:* Tutullacac—; *Twi:* Tortortortor—; *Visayan:* Asisio, Sisio—.

4. **Physalis peruviana** Linn. Sp. Pl. II (1670).

More bushy plant than *Physalis minima* with larger flowers. Corolla 13 mm. with 5 large purple spots near base. Fruiting calyx 2.5-4.5 cm. long.

Distribution: Tropical America. Long being grown in Indian gardens.

The plant is used as a diuretic in La Reunion.

In South Africa, the Zulus administer an infusion of the leaf as an enema to children with abdominal upsets. The heated leaf is applied by Europeans as a poultice to draw inflammations.

Afrikaans: Appelderliefde, Appelliefie, Kaapse Klapbes, Pompelmœr—; *Bengal:* Tekari, Tepiriya, Tepuria, Tophli—; *Betsileo:* Voanaka—; *Burma:* Pongpin, Pungben—; *English:* Cape Gooseberry—; *Goa:* Chirput—; *Hindi:* Macao, Tepariyo, Tipari—; *Hova:* Voanantsindrana—; *Konkani:* Chirput—; *La Reunion:* Poc-poc—; *Madagascar:* Vantsipaotaka—; *Marathi:* Phopti—; *North-Western Provinces:* Tipari, Tipariya—; *Philippines:* Capuli—; *Sanskrit:* Tankasi—; *South Africa:* Cape Gooseberry, Wild Gooseberry—; *Tagalog:* Potocan, Potocpotocan—; *Telugu:* Buddabusara, Busarakaya, Pambudda—; *Visayan:* Sisio—; *Zulu:* uGqumugqumu—.

CAPSICUM (Tourn.) Linn.

Annual or perennial herbs, glabrous or nearly so. Leaves entire or repand. Pedicels axillary or 2-3 together. Calyx campanulate, subentire or minutely toothed, much shorter than the fruit. Corolla rotate; lobes 5, valvate in bud. Stamens 5, attached near the base of the corolla; anthers not longer than the filaments, dehiscing longitudinally. Ovary 2- rarely 3- celled; style linear, stigma subcapitate. Berry very variable in form and size, many-seeded. Seeds discoid, smooth or subscabrous; embryo peripheric.—Species 30.—Central and S. America.

A. 0.75-1.8 m. high .... 1. *C. frutescens.*
B. 60-90 cm. high
  1. Herbaceous or suffrutescent .... 2. *C. annuum.*
  2. Shrubby .... 3. *C. minimum.*

The fruit and seeds are powerful stimulants.

The following species are used medicinally in Europe, North America, Mexico, Guiana—*C. annuum* Linn.—; in Cambodia, the Philippine Islands, La Reunion, Guinea— *C. minimum* Roxb.—; in China—*C. anomalum* Fr. and Sav.—; in Brazil—*C. annuum* Linn., *C. baccatum* Linn., *C. conoidum* Mill., *C. cordiforme* Mill., *C. frutescens* Linn., *C. grossum* Linn., *C. ovatum* DC., *C. pendulum* Willd.—; in Peru—*C. conicum* Mey.—; in Madagascar—*C. annuum* Linn., *C. frutescens* Linn., *C. minimum* Roxb.—; in the Gold Coast—*Capsicum spp.*—.

The fruits of *C. annuum*, *C. baccatum*, and *C. frutescens* are used in the preparation of arrow-poisons.

OFFICIAL:—The fruit of *C. annuum* Linn. (Austria, Belgium, Denmark, Germany, Holland, Hungary, Japan, Norway, Russia, Sweden, Switzerland);—var. *fructu pyramidali longo* Brot. (Portugal); *C. frutescens* Linn. (United States); *C. longum* DC. (Austria, Norway); *C. minimum* Roxb. (Great Britain).

1. **Capsicum frutescens** Linn. Hort. Cliff. (1737) 60.—*C. minimum* Willd. Gard. Dict. ed. 6 (1752) no. 10.—PLATE 679A.

Shrubby perennial plants, 0.75-1.8 m. high; branches angular. Leaves broadly ovate, acuminate, usually wrinkled, more or less pubescent. Pedicels slender, usually 2 or more together, 2.5-5 cm. long. Calyx embracing the base of the fruit, usually cup-shaped. Corolla white or greenish white often with ochreous markings in the throat. Fruit red, ovoid, obtuse, or oblong, acuminate.

Distribution: Cultivated, but not extensively, often found as an escape.

The fruit causes a burning sensation; increases appetite; useful in indigestion, diarrhœa, chronic ulcers, loss of consciousness, delirium (Ayurveda).

The fruit is bitter, pungent; expectorant; useful in brain complaints, muscular pain; weakens the body; increases biliousness; produces a burning sensation at the anus (Yunani).

Chillies are used in native practice in typhus, intermittent fevers, and dropsy; also in gout, dyspepsia, and cholera. Externally, they are used as rubefacient and, internally, as stomachic.

A dose of ten grains of finely powdered capsicum seed, given with an ounce of hot water, two or three times a day, sometimes shows wonderful effects in cases of delirium tremens.

Mustard oil in which the roots have been mixed is used by the Mundas of Chota Nagpur to shampoo the extremities in order to promote circulation of the blood.

In Guiana, the fruit is considered a powerful stimulant. Combined with cinchona it is an excellent antiperiodic. It is recommended as a gargle for sore throat.

In Madagascar, the fruit is given in delirium tremens.

Arabic: Filfileahmar—; *Bengal:* Gachmarich, Lallankamurich, Lalmarich, Lanka—; *Bombay:* Lalmirachi—; *Brazil:* Quiyacumari—; *Canarese:* Menashinakayi—; *English:* African Chillies, Cayenne Pepper, Chillies, Goat Pepper, Spur Pepper—; *French:* Axi, Carive, Corail des jardins, Malaguette, Maniguette, Mélaguette, Méleguette, Méliguette, Piment, Piment de Cayenne, Piment de Guinée, Piment enragé, Piment des jardins, Piment rouge, Poivre de Guinée, Poivre du Brésil, Poivre de Calicut, Poivre long, Poivre des nègres, Poivre rouge, Poivre de Turquie, Poivron—; *French Guiana:* Piment—; *Goa:* Pimenta—; *Gujerati:* Mirchi—; *Hasada:* Cundulmarci—; *Hausa:* Barkono—; *Himalayas:* Kursani—; *Hindi:* Gachmirich, Lalmircha, Lalmirich, Lankamirchi—; *Hova:* Sakaifantsinakoho, Sakay—; *Italian:* Corallo, Peperone—; *Konkani:* Mirsang—; *Languedoc:* Courats, Malaquetti—; *Malayalam:* Chabai, Chabelombok, Kappalmelaka, Ladamera, Ladamerachina, Ladumira—; *Marathi:* Mirchi, Tambhudamirchingay—; *Moldavian:* Piperus—; *Naguri:* Condolmarchi—; *Nasirabad:* Garhimirchi—; *Persian:* Fulfilisurkh—; *Portuguese:* Pimenta longa, Pimentao, Pimenteira—; *Roumanian:* Ardeiu—; *Sakalave:* Pilopilo—; *Sanskrit:* Ajadakumaricha, Brahumaricha, Katuvira, Marichiphala, Raktamaricha, Ujjvala, Tikshna, Tivrashakti—; *Sinhalese:* Gasmiris—; *Swahili:* Pilipili—; *Tamil:* Mullagay—; *Telugu:* Golakonda, Miraph, Mirapakaiya, Simamirapakaiya, Sudimirapakaiya—; *Urdu:* Lalmarach—.

2. **Capsicum annuum** Linn. Hort. Cliff. (1737) 59.

Herbaceous or suffrutescent, annual or biennial, usually 0.6-0.9

m. (sometimes 1.2-1.5 m.) rarely only 30 cm. high. Pedicels usually solitary. Corolla usually white (in var. *longum purple*).

Distribution: Widely cultivated.

The fruit has a bitter sharp taste; expectorant, analgesic; enriches the blood; lessens inflammation and pain (Yunani).

It acts as an acid stimulant, and externally as a rubefacient. It is used in putrid sore-throat, and scarlatina; also in ordinary sore-throat, hoarseness, dyspepsia, and yellow fever; and in diarrhœa occasionally; also in piles.

The fresh fruit is given as a stimulant in cases of snake-bite; but it has no value in the symptomatic treatment, and is not an antidote to the poison (Mhaskar and Caius).

In Madagascar, the fruit is given in delirium tremens.

The fruit enters into the preparation of the arrow poisons of the Dayaks of Borneo, and the Youri-Tabocas of Brazil.

Arabic: Filfiliahmar—; *Bengal:* Dhanlungkamurich, Lalmorich, Lankamorich—; *Burma:* Gnayoke, Gnayokenopmyan, Nayop, Nayusi—; *Danish:* Spansk Peber—; *Deccan:* Lalmirch, Mirchi—; *Dutch:* Spaansche peper—; *Dutch East-Indies:* Lombok, Tjabe— *English:* Bird's Eye Chilli—; *French:* Axi, Carive, Corail des jardins, Malaguette, Maniguette, Piment, Piment enragé, Piment rouge, Piment des jardins, Poivre d'Espagne, Poivre de Guinée, Poivre long, Poivre des nègres, Poivre de Portugal, Poivre rouge, Poivre de Turquie, Poivron—; *German:* Paprica, Spanischer Pfeffer—; *Gujerati:* Lalmirich, Marcha—; *Hindi:* Gachmarich, Lalmirich—; *Hova:* Pilipily, Sakaibe, Sakaifantsinakoho, Sakay—; *Hungarian:* Paprika—; *Italian:* Capsico annuo, Corallo, Peperone—; *Konkani:* Putaquepariu—; *Languedoc:* Courats, Malaquetti—; *Malabar:* Kappalmelaka—; *Malayalam:* Chalie, Lodachina—; *Norwegian:* Spansk pepper—; *Persian:* Fifilisurkh—; *Philippines:* Chile, Chili picante, Lara, Malisa—; *Portuguese:* Pimenta malagueta, Pimentao, Pimentao cornicabra—; *Roumanian:* Paprica—; *Russian:* Krasniy peretz, Struchkoviy peretz—; *Sakalave:* Pilopilo—; *Sinhalese:* Miris—; *Swahili:* Pilipili—; *Swedish:* Spansk peppar—; *Tagalog:* Chilengbundoc, Pasitis, Sili—; *Tamil:* Usimulagay—; *Telugu:* Sudmirapakaya—; *Visayan:* Quiticot—; *Youri-Taboca:* Kiynhaavi—.

3. **Capsicum minimum** Roxb. Fl. Ind. I (1832) 574.—Plate 680.

Shrubby, about 60 cm. tall, spreading. Leaves thin lanceolate. Flowers 2-3, together. Calyx cup-shaped, teeth 5, very small. Corolla 6.5 mm. across, white; anthers purplish blue. Fruit ovoid, oblong cylindric orange scarlet, 13-20 mm. long, erect.

Distribution: Malay Peninsula.—Native place uncertain.

The fruit is an acrid stimulant. It is given in atonic dyspepsia, in diarrhœa arising from putrid or crude ingesta in the intestines, and in vomiting of bilious remittent fever.

The bruised fruit in the form of poultice acts as a rubefacient and counter-irritant. In the West Indies, the fruit is used in scarlatina.

It is much used medicinally in Madagascar, where it is considered stimulant, sialogogue, revulsant, digestive, laxative, antiseptic, and styptic.

In Cambodia, it is mostly used as a diaphoretic. As a digestive stimulant it is prescribed in jaundice, and in liver troubles with œdema.

Arabic: Filfiliahmaa—; *Bengal:* Dhanlungkamurich, Lalmorich, Lankamorich—; *Burma:* Gnayoke, Gnayokenopinyan, Nayop, Nayusi—; *Cambodia:* Mtes chhnas, Mtes kda chhmar, Mts Khmang—; *Canarese:* Parangimenasinakayi—; *Deccan:* Lalmirch, Mirchi—; *English:* Bird's-Eye Chilli, Bird's-Eye Pepper—; *Gujerati:* Lalmirich, Marcha—; *Hindi:* Gachmarich—; *Hova:* Sakaipilo—; *Madagascar:* Piment Martin—; *Malayalam:* Kantari, Kappalmulaku, Lodachina, Shalie—; *Persian:* Filfilisurkh—; *Philippines:* Chili, Chili picante, Lara, Malisa—; *Sanskrit:* Maricha—; *Sinhalese:* Miris—; *Tagalog:* Chilengbundoc, Pasitis, Sili—; *Tamil:* Peymilagay, Sinaippachaimilagay, Usimilagay—; *Telugu:* Mirepakaya, Miriyapukaya, Sudimire-pakaya—; *Uriya:* Dhanuamoricho—; *Visayan:* Quiticot—.

Withania Pauq.

Unarmed shrubs, often hoary-tomentose. Leaves entire. Flowers usually fascicled, subsessile or shortly pedicellate, sometimes

diœcious. Calyx campanulate, 5-6-toothed, accrescent in fruit. Corolla campanulate; lobes 3-6, short, valvate in bud. Stamens 5, attached near the base of the corolla; anthers dehiscing longitudinally. Ovary 2-celled; ovules numerous; style linear; stigma shortly 2-fid. Berry globose, enclosed in the enlarged calyx. Seeds many, discoid; embryo peripheric.—Species 5.—Palæotropics and subtropics.

1. Flowers hermaphrodite. Berry loosely enclosed in the accrescent calyx .... 1. *W. somnifera.*
2. Flowers dioecious. Berry tightly girt by the accrescent calyx .... 2. *W. coagulans.*

W. somnifera Dun. is used medicinally in Malta, Hausa, South Africa, and La Reunion.

1. **Withania somnifera** Dunal in DC. Prodr. XIII, pt. 1 (1852) 453.—*Physalis somnifera* Linn. Sp. Pl. (1753) 182; Wight Ic. t. 853.—PLATE 681.

A branched erect undershrub 0.3-1.5 m. high; branches terete, usually clothed with mealy stellate hoary tomentum. Leaves 5-10 by 2.5-5 cm., ovate, subacute, entire, more or less minutely stellately pubescent, base acute; main nerves about 6 pairs, stout, conspicuous; petioles 6-13 mm. long, stellately tomentose. Flowers greenish or lurid yellow, usually about 5 together in a sessile or nearly sessile umbellate cyme; pedicels 0-4 mm. long. Calyx 5 mm. long in flower, stellately tomentose; teeth 2.5 mm. long, linear, acute, from a deltoid base. Corolla 8 mm. long, divided rather more than ½-way down; lobes lanceolate, acute, pubescent outside. Filaments 3 mm. long, slender, glabrous; anthers broadly elliptic (almost orbicular), 1.25 mm. long. Ovary glabrous; style glabrous. Berry red, smooth, 6 mm. diam., enclosed in the inflated calyx which reaches more than 2.5 cm. diam., and is globose, slightly 5-angled, pointed with the connivent calyx-teeth and scurfy-pubescent outside. Seeds 2.5 mm. diam., yellow, somewhat scurfy.

Distribution: In the drier parts of India, Baluchistan, Ceylon,—Mediterranean regions, Canaries, Cape of Good Hope.

The leaves are applied to tumours and to tuberculous glands. —The tuber has a bitter, sharp, acrid, taste; heating, aphrodisiac,

tonic, alterative, anthelmintic; useful in "vata" and "kapha", inflammations, psoriasis, bronchitis, asthma, consumption, ulcers, scabies, marasmus of children, insomnia, senile debility; alexipharmic (Ayurveda).

The tuber is slightly bitter; tonic, aphrodisiac, emmenagogue; good in asthma, inflammations, leucoderma, bronchitis, lumbago, arthritis; favours conception (Yunani).

The root is regarded as tonic, alterative, and aphrodisiac, and is used in consumption, emaciation of children, debility from old age, rheumatism, etc. It has also narcotic, diuretic, and deobstruent properties.

Rajputs regard the root as useful in rheumatism and dyspepsia. In the Punjab, it is used for lumbar pains and considered aphrodisiac. In Sind, it is used to cause abortion.

The ground root and bruised leaves are employed as a local application to carbuncles, ulcers, and painful swellings. The leaves are very bitter, and are given in infusion in fevers. The fruit is diuretic.

The seeds are employed to coagulate milk like those of *W. coagulans.* They are diuretic and hypnotic.

In Wad and Kalat, a fomentation of the leaves is used to cure sore eyes; it cures boils and swellings of the hands and feet, causing the boils to ripen and burst. In Las Bela and in the Pab Hills, the leaves are used for killing lice. The flowers are applied to sores in Kotra (Hughes-Buller).

The Sutos use a decoction of the root for colds and chills, while Transvaal Sutos administer it to tone up the uterus in women who habitually miscarry and in order to remove retained conception products. The Sutos also take an infusion of the bark for asthma and apply an ointment of the leaf to bed-sores.

An enema of the decorticated root is given by the Zulus to feverish infants. They regard the plant as a specific for gangrenous rectitis, using an infusion of the root as an enema. They also use the plant in treating syphilis, and successfully employ the leaf in the healing of sores.

The Xosas apply the fresh juice of the leaf to anthrax pustules, and use the plant for disinfecting anthrax-infected meat. They make an ointment for wounds and sores by boiling the leaf in fat, and administer a decoction of the root-bark in asthma and other chest complaints. The green berries are bruised, and rubbed into ringworm in both human beings and animals. A paste of the leaf is applied to syphilitic sores, and a paste of the green berry, leaf, and small twigs to saddle sores and girth gall in horses.

Europeans, in the Orange Free State, apply a leaf paste to erysipelas, take a decoction of the root for chest complaints, and use a decoction of the leaf externally and internally in the treatment of hæmorrhoids.

Pammel states that the plant is abortifacient.

It is considered a tonic and aphrodisiac by the Indian physicians who use it in general debility, rheumatism, consumption, and loss of appetite. A patient with chronic gastritis and marked loss of appetite and general debility was given a full course of the powdered root alone for a few weeks without any benefit. He was then put on this and *Argyreia spinosa* which is considered a very good tonic, with the same negative result. A woman with hectic fever of tubercle and marked general weakness was put on the same combination. The result was disappointing (Koman).

The root in combination with other drugs is prescribed for snake-bite (Charaka, Yogaratnakara) and scorpion-sting (Charaka). It is not an antidote to either snake-venom (Mhaskar and Caius) or scorpion-venom (Caius and Mhaskar).

An examination of the chemical constituents was undertaken by Majumdar and Guha (18th Ind. Sc. Congress; Nagpur, 1931).

Afrikaans: Geneesblaar, Meidjieblaar, Vuilsiektebos—; *Arabic:* Kaknajehindi—; *Bengal:* Ashvaganda, Asvagandha—; *Bombay:* Asgund, Asvagandha—; *Canarese:* Amangura, Ashvagandha, Ashvagandhi, Hirimaddina, Sogadeberu—; *Cutch:* Asuth—; *Deccan:* Hindikaknuj, Natkiasgand—; *Fingo:* uVimba—; *Gujerati:* Asan, Asoda, Ghodaasoda—; *Hausa:* Karama anta—; *Hindi:* Asgand, Punir—; *Jhalawan:* Baibru—; *Kachhi:* Chil, Lakri—; *Kalat:* Lahaibaru—; *Kotra:* Chil, Lakri—; *Las Bela:* Baibru, Bodmar—;

Malayalam: Amukkiram, Pevetti—; *Marathi:* Askandha, Kanchuki, Tilli—; *Pab Hills:* Baibru—; *Persian:* Kaknajehindi, Mehernanbarari—; *Porebunder:* Ghodaakun, Ghodaasun, Ghodakun, Sandiyanapopata—; *Punjab:* Ak, Aksan, Asgand, Asgandnagori, Isgand—; *Pushtu:* Kutilal, Sin—; *Sanskrit:* Ashvagandha, Ashvakandika, Ashvaroha, Ashvavarshaka, Balada, Balaja, Gandhapatri, Haya, Hayapriya, Kala, Kambuka, Kamrupini, Kushthagandha, Kushthagandhini, Palashaparni, Priyakari, Punya, Pushtida, Pushtipavira, Shyamala, Turagagandha, Turagi, Vajigandha, Vajikari, Vajini, Varada, Varagatrakari, Varahakarni, Varahapatri, Vataghni—; *Sinhalese:* Amukkara—; *Suto:* Bofepha, Moferangopa, Moferangope, Mosalamarupi, Mosalamopeng—; *Tamil:* Amukkira, Asubam, Asuvagandi—; *Telugu:* Asvagandhi, Dommadolu, Penneru, Pillivendramu, Vajigandha—; *Tigré:* Athmai—; *Tigrinia:* Agoll, Agull—; *Urdu:* Asgandanagaori—; *Uriya:* Asugandha—; *Wad:* Lahaibaru—; *Xosa:* ubuVumba—; *Zulu:* ubuVimba—.

2. **Withania coagulans** Dunal in DC. Prodr. XIII, pt. 1 (1852) 685,—*Puneeria coagulans* Stocks; Wight Ic. t. 1616.—Plate 682.

A rigid grey-tomentose undershrub 0.3-0.9 m. high; branches terete, clothed with dense grey or yellowish white tomentum. Leaves 2.5-5.7 by 1-2.2 cm., lanceolate-oblong, obtuse, entire, clothed with a persistent not easily detachable greyish tomentum, of a uniform colour on both sides, thick, more or less rugose, base acute, running down into an often obscure petiole; petioles 6 mm. long but often indistinct. Flowers dioecious, in axillary clusters; pedicels 0-6 mm. long, deflexed, slender. Calyx 6 mm. long, campanulate, clothed with fine stellate grey tomentum; teeth triangular, 2.5 mm. long. Corolla 8 mm. long, stellately mealy outside, divided about $^1/_3$ the way down; lobes ovate-oblong, subacute. Male flowers: Stamens about level with the top of the corolla-tube; filaments 2 mm. long, glabrous; anthers 3-4 mm. long. Ovary ovoid, without style or stigma. Female flowers: Stamens scarcely reaching ½-way up the corolla-tube; filaments about 0.85 mm. long; anthers smaller than in the male flowers, sterile. Ovary ovoid, glabrous; style glabrous;

stigma mushroom-shaped, 2-lamellate. Berry 6-8 mm. diam., globose, smooth, closely girt by the enlarged membranous calyx which is scurfy-pubescent outside. Seeds 2.5-3 mm. diam., somewhat ear-shaped, glabrous.

Distribution: Punjab, Sutlej Valley, Sind, Baluchistan.—Afghanistan.

The fruit is sweet; applied to wounds; used in asthma, biliousness, strangury.—The seeds are emmenagogue, diuretic; useful in lumbago, ophthalmia; lessen the inflammation of piles; cause liver troubles (Yunani).

The ripe fruits are supposed to possess anodyne or sedative properties. They are alterative, diuretic and believed to be useful in chronic liver complaints. They are used as an emetic.

The dried fruits, sold as Punir-ja-fota in Sind, are employed in dyspepsia and flatulent colic, and other intestinal affections. They are prescribed in infusion, either alone or conjoined with the leaves and twigs of *Rhazya stricta,* an excellent bitter tonic. The dried fruit is used for coagulating milk in the process of cheese manufacture.

In Bombay, the berries have a reputation as blood purifiers.

Honigberger says that the bitter leaves are given as febrifuge by the Luhanees.

In Las Bela, the fruit is pounded and used as a cure for colic; the wood is used for cleaning the teeth. In the Ormera Hills, the smoke is applied to aching teeth 'to destroy the worm' (Hughes-Buller).

Arabic: Javzulmizaja, Kaknajehindi—; *Bengal:* Ashvaganda—; *Bolan:* Panirband—; *Bombay:* Kaknaj—; *Canarese:* Asvagandhi—; *Deccan:* Hindikaknaj, Natkiasgand—; *English:* Cheese-maker, Indian Rennet, Vegetable Rennet—; *Fort Sandeman:* Khamazurae, Makhazurae—; *Hindi:* Akri, Binputakah, Punir—; *Jhalawan:* Awishk—; *Kila Saifulla:* Khamazurae, Makhazurae—; *Kohlu:* Khamazurae, Makhazurae—; *Las Bela:* Kapoi, Kewti, Panirbad—; *Loralai:* Khamazurae, Khamzur, Makhazurae—; *Mula Pass:* Panirband—; *Persian:* Kaknajehindi, Kakunbah, Panirbad—; *Punjab:* Khamjaria, Khamjira, Khumazare, Kutilana, Makhazura, Panir, Shapiang,

Spinbajja—; *Pushtu:* Khamazora, Shapranga, Spinbajja—; *Shahrig:* Khamazurae, Makhazurae—; *Sibi:* Panir—; *Sind:* Punirband, Punirjafota—; *Tamil:* Amukkura—; *Telugu:* Pennerugadda—; *Urdu:* Kakanaj—.

NICANDRA Adans.

An annual, glabrous herb. Leaves petioled, ovate-lanceolate, toothed or lobed. Pedicels axillary, solitary. Calyx sub-5-partite; sepals in fruit much enlarged, cordate-ovate, acute, reticulate. Corolla campanulate, blue; limb 5-plaited. Stamens attached near the base of the corolla, filaments linear, anthers oblong, dehiscing longitudinally. Ovary 3-5-celled; style linear, stigma obscurely 3-5-lobed; ovules very many. Berry globose, 3-5-celled. Seeds very many, compressed, subdiscoid; embryo peripheric.—Species 1.—Peru.

N. physaloides Gaertn. is used medicinally in Madagascar.

1. **Nicandra physaloides** Gaertn. Fr. II (1791) 237, t. 131, f. 2; Bot. Mag. t. 2458.

An erect annual glabrous herb with ovate or ovate-lanceolate lobed or coarsely toothed leaves 7.5-15 cm. long tapering into the petiole and handsome light purple flowers 2.5 cm. or more diam., terminal and becoming leaf-opposed or axillary. Sepals overlapping and making the calyx 5-angular, somewhat cuspidate, over 2.5 cm. in fruit. Corolla with somewhat campanulate tube and spreading limb.

Distribution: Native of Peru. Widely cultivated.

The plant is said to be diuretic (O'Shaughnessy).

In Madagascar, a decoction of the leaf is used to destroy pediculi capitis. The seeds, mixed with suet, are thrown on a red hot place and the fumes inhaled for toothache.

Hova: Tsipolobazaha—; *Madagascar:* Boreda—.

LYCIUM Linn.

Spinous usually glabrous shrubs. Leaves small, alternate or often fascicled, linear, terete or flat. Pedicels usually solitary (rarely

fascicled at the nodes); flowers small. Calyx campanulate, at first 5-merous, then irregularly 3-5-lobed or 2-lipped, in fruit not or scarcely enlarged. Corolla tubular-infundibuliform; lobes 5 (rarely 4), imbricate in bud, spreading in flower. Stamens 5 (rarely 4) on the corolla-tube; anthers exserted or included, dehiscing longitudinally. Ovary 2-celled; ovules few or many; style filiform; stigma subcapitate. Berry small, globose or oblong. Seeds many, few, or solitary, compressed, scrobiculate; embryo peripheric.—Species 100. —Temperate regions.

1. Leaves linear-oblong .... 1. *L. barbarum.*
2. Leaves linear .... 2. *L. ruthenicum.*

The leaves are stimulant.

L. barbarum Linn. is used medicinally in Europe; *L. chinense* Mill. in China; *L. vulgare* Dun. in North America; *L. arenifolium* Miers., *L. kraussii* Dun., *L. prunus-spinosa* Dun. in South Africa.

The leaves of *L. europaeum* Linn. (*L. spinosum* Hass.) are official in Portugal.

1. **Lycium barbarum** Linn. Sp. Pl. (1753) 192.—Plate 683 (under *L. europaeum* Linn.).

A spinous shrub reaching 3 m. high; branches white or grey, armed with sharp conical spines which sometimes elongate and bear leaves and flowers. Leaves very variable, sometimes solitary, oblong-lanceolate, reaching 4.5 cm. by 6 mm., more commonly in fascicles and oblong-spathulate or linear, obtuse, attenuated into a short petiole, glabrous or nearly so. Flowers solitary or in fascicles of 2-5; pedicels filiform, 6-13 mm. long. Calyx in flower glabrous, somewhat rugose outside, 4 mm. long, cyathiform, often becoming irregularly lobed and sometimes 2-lipped in fruit; teeth 4-6, oblong, obtuse, about 0.85 mm. long, with membranous margins. Corolla 1-1.3 cm. long, glabrous; lobes 2.5-4 mm. long, oblong, obtuse. Stamens exserted beyond the corolla-tube; filaments flat, glabrous at the base; anthers 1.25 mm. long, orbicular. Ovary ovoid-oblong, glabrous, seated in a large membranous cup-shaped disk; style glabrous, exserted beyond the corolla-tube; stigma mushroom-headed, 2-lamellate. Berry bright red, 6 mm. diam., seated on the slightly enlarged and

often deformed calyx. Seeds 2.5 mm. diam., discoid or subreniform, embedded in a soft glutinous viscid pulp, very minutely pitted, orange-yellow.

Distribution: Kathiawar, Sind, Baluchistan, Punjab.

The berry is bitter; emmenagogue; enriches the blood; useful in bleeding piles, scabies, ascites, toothache.—The juice of the leaves improves the eyesight (Yunani).

The berries are used as an aphrodisiac (Stewart).

Arabic: Ankunehhindladberah—; *Delhi:* Chirchitta, Chiritta—; *French:* Jasmin bâtard, Jasminoïde, Liciet, Lyciet—; *Kulanch:* Rinzuk, Zirruk—; *Malta:* European Boxthorn, Agutoli, Spina-Christi, Ghauseg—; *Marathi:* Gangro—; *Merwara:* Achmehudi, Erkmehndi—; *Persian:* Gune, Khardare—; *Portuguese:* Cambrœira, Epinheiro alvar na casca—; *Punjab:* Chirchitta, Ganger, Kangi, Kangu, Kungu, Mral—; *Sind:* Ganger, Gangro—; *Urdu:* Chirchitta—; *Zaru:* Kohtor—.

2. **Lycium ruthenicum** Murr. Comm. Gött. (1779) 2, tab. 2.

Shrubby, glabrous, glaucous. Branches erect, flexuose, spinous, whitish. Leaves fascicled, fleshy, narrowly linear-spathulate, obtuse, attenuate at the base. Flowers fascicled, somewhat long pedunculate. Calyx membranous, campanulate, bilipped; lips obtuse, irregularly and shortly dentate. Corolla-lobes ovate, 1½ times shorter than the tube. Filaments hirsute at the base; anthers exserted. Berries black.

Distribution: Baluchistan.—Turkestan, Persia, Transcaucasus.

In Ormara, the plant is made use of as an antimony for blindness in camels (Hughes-Buller).

Ormara: Jarak—.

Atropa Linn.

A coarse, lurid, glabrous herb. Leaves entire, elliptic-lanceolate. Pedicels axillary, solitary, nodding. Flowers somewhat large, dirty purple or lurid yellow. Calyx large, deeply 5-lobed, scarcely larger in fruit. Corolla widely tubular-campanulate; lobes 5,

triangular, imbricate in bud. Stamens attached near the base of the corolla, filaments linear; anthers oblong, dehiscing longitudinally. Ovary 2-celled; style linear, stigma obscurely 2-lobed. Berry globose. Seeds many, compressed; embryo peripheric.—Species 2.—Europe, Mediterranean, Asia.

The leaves of *Atropa Belladonna* Linn. are official in Austria, Belgium, Denmark, France, Germany, Holland, Hungary, Italy, Norway, Russia, Spain, Sweden and Turkey; the leaves and roots in Great Britain, Switzerland, and the United States.

A. Belladonna Linn. (*Belladonna baccifera* Lamk.) in Portugal, the roots and the plant.

1. **Atropa belladonna** Linn. Sp. Pl. (1753) 260.—PLATE 684B.

An erect, glandular-pubescent or nearly glabrous herb, 0.6-0.9 m. Leaves stalked, ovate-lanceolate, 10-20 cm., entire, long-pointed; upper ones usually with a much smaller leaf springing from the same point. Flowers pale purple, tinged with yellow or green, 2 cm. diam., single or drooping, usually axillary stalks. Calyx lobed nearly to the base; segments leaf-like. Corolla bell-shaped; lobes 5, short, broad, spreading. Bases of filaments hairy, dilated, covering the ovary. Ovary 2-celled; style longer than the corolla, stigma green. Berry globose, 2 cm. diam., purple-black, surrounded at the base by the enlarged, spreading calyx.

Distribution: W. Himalaya, 6,000—11,000 ft., from Kashmir to Simla.—Europe, Orient.

The berries are highly poisonous; in case of poisoning give emetics with milk or honey and water (Yunani).

The root and leaves are narcotic, diuretic, sedative, mydriatic.

It is used as an anodyne in febrile conditions, night-sweats, coughs, whooping cough, etc., also in spermatorrhœa. It suppresses glandular secretions.

Externally it is used in gouty and rheumatic inflammations.

Arabic: Inaheththalih, Ustrung—; *Bengal:* Yebruj—; *Bombay:* Girbuti—; *Catalan:* Belladona—; *Denmark:* Belladonna, Galnebær—; *Dutch:* Dolle nachtschade, Dolkruid, Doodkruid—; *English:* Bane Wort, Belladonna, Black Cherry, Daft berries, Deadly Nightshade,

Deadly Dwale, Death's herb, Dwale, Dway Berries, Great Morel, Jacob's Ladder, Mad, Manicon, Mekilwort, Naughty Man's Cherry, Sleeping Nightshade—; *French:* Belladone, Belle dame, Bonne dame, Bouton noir, Herbe empoisonneuse, Mandragore baccifère, Guigne de côte, Morelle furieuse, Morelle marine, Permenton—; *German:* Bollkraut, Dollkraut, Dollwurz, Gieftkriesi, Irrbeere, Schlafbeere, Schlafkraut, Schœne Frau, Schwindelbeere, Tollkirsche, Tollkraut, Tollwurz, Vahrenkraut, Waldnachtschatten, Wallbaum, Wolfbeere, Wolfsbeere, Wolfskirsche, Wutbeere, Wutkirsche—; *Greek:* Strychnos manikos—; *Hindi:* Angurshefa, Luckmuna, Luckmunee, Sagangur—; *Hungarian:* Nadragulya—; *Italian:* Belladonna—; *Norway:* Belladonna—; *Persian:* Rubahturbak, Merdumseeah, Sageangur—; *Portuguese:* Belladona, Herva mydriatica—; *Punjab:* Suchi—; *Roumanian:* Ciresea lupului, Doamna mare, Iarba buna, Iarba codrului, Imparatasea burienelor, Matraguna—; *Russian:* Belladonna, Krasavka, Sonnaya—; *Spanish:* Belladama, Belladona, Solano furioso—; *Sweden:* Belladonna—; *Turkey:* Belladon—.

DATURA Linn.

Herbs or shrubs glabrous or minutely pubescent. Leaves large, entire or coarsely sinuate-dentate. Pedicels solitary. Flowers large, purple or white, erect or pendulous. Calyx long-tubular, herbaceous, 5-toothed; in fruit circumscissile above the base, the upper part deciduous. Corolla long, tubular-infundibuliform; mouth wide; limbplicate, entire or shortly 5-10-lobed, the lobes often acuminate. Stamens attached near the base of the tube, included; filaments filiform; anthers linear, longitudinally dehiscent. Ovary 2- or spuriously 4- celled; ovules numerous; style filiform; stigma 2-lobed. Capsules ellipsoid, 4-celled, usually spinous, 4-valved or irregularly breaking up near the apex. Seeds very many, compressed; embryo peripheric.—Species 15.—Tropical and warm temperate regions.

A. Capsule deeply 4-valved, erect. Corolla 5-toothed. Flowers white .... 1. *D. stramonium.*
B. Capsule opening irregularly near the apex, reflexed or spreading

1. Plant densely clothed with greyish green tomentum. Corolla white 10-toothed. Capsule globose, reflexed, covered with long slender spines	4.	*D. metel.*
2. Plant glabrous or minutely pubescent. Corolla 5-toothed, usually purplish outside. Capsule reflexed, covered with blunt tubercles	2.	*D. fastuosa.*
3. Plant glabrous or nearly so. Calyx and corolla puberulous outside. Corolla 5-toothed, white or cream-coloured. Capsule spreading, covered with sharp spines	3.	*D. alba.*

The plant is violently narcotic.

The leaves and the root are a good palliative in spasmodic asthma.

The following species are used medicinally in Europe—*D. ferox* Linn., *D. metel* Linn., *D. stramonium* Linn.—; in China—*D. alba* Nees.—; in Cambodia—*D. metel* Linn.—; in Malaya—*D. alba* Nees., *D. fastuosa* Linn., *D. metel* Linn.—; in Annam, the Philippine Islands, the Islands of Madagascar— *D. alba* Nees., *D. fastuosa* Linn.—; in La Reunion—*D. alba* Nees.—; in Central Australia—*D.* hopwoodii F. v. Muell.—; in Chile—*D. arborea* Linn.—; in Brazil—*D. stramonium* Linn.—; in Guiana—*D. ceratocaula* Jacq., *D. stramonium* Linn.—; in California—*D. meteloides* DC.—; in Guinea—*D. metel* Linn.—; in the Gold Coast—*D. metel* Linn., *D. stramonium* Linn.—; in South Africa—*D. stramonium* Linn., *D. tatula* Linn.—.

OFFICIAL :—The leaves of *D. Metel* Linn. (Great Britain), *D. Stramonium* Linn. (Austria, Belgium, Denmark, France, Germany, Great Britain, Holland, Italy, Japan, Norway, Russia, Spain, Sweden, Turkey), *D. Tatura* Linn. (Japan).

The leaves and flowering tops of *D. stramonium* Linn. in the United States.

The leaves and seeds of *D. fastuosa* Linn. var. *alba* Nees. in Great Britain, of *D. stramonium* Linn. in Switzerland.

The seeds and the plant of *D. Stramonium* Linn. (*Stramonium spinosum* Lamk.) and *D. Tatula* Linn. in Portugal.

1. **Datura stramonium** Linn. Sp. Pl. (1753) 179.—PLATE 684A.

A coarse annual, 0.6-1.2 m. high, glabrous or farinose-puberulous. Leaves stalked, about 18 cm. long, ovate, deeply toothed

or sinuate, pale green. Calyx 2.5-4.5 cm.; lobes 6 mm. long, ovate-lanceolate. Corolla 7.5-15 cm. long, white, 2.5-7.5 cm. diam.; lobes 5, cuspidate. Capsule erect, ovoid, deeply 4-valved, covered with rigid long and short prickles surrounded below by the enlarged reflexed base of the calyx.

Distribution: From Kashmir to Sikkim up to 8,000 ft., Baluchistan, hilly districts of Central and S. India.—Throughout the temperate and warmer regions of the world.

The seeds have an acrid, bitter, sharp taste; heating, tonic, febrifuge, anthelmintic, alexiteric, emetic; useful in leucoderma, skin diseases, ulcers, itching, bronchitis, biliousness, jaundice, piles (Ayurveda).

The whole plant is toxic, narcotic, aphrodisiac; applied topically it removes the pain of tumours and piles.—The leaves after roasting are applied locally to relieve eye pain, headache, nose trouble, enlargement of the testicle, and boils.—The root is useful in reducing inflammation.—The seeds are narcotic, febrifuge, anthelmintic; good in inflammations, painful piles, biliousness; cause headache (Yunani).

The leaves and the seeds are antispasmodic, anodyne, narcotic. They act similarly to Belladonna, and do not constipate.

The inhalation of the smoke from the burning leaves is recommended for relieving attacks of asthma. It is a better cough remedy than opium, as it does not arrest secretions.

The young fruits are said to be sedative and slightly intoxicating.

In Malaya, the leaves are almost universally used in the treatment of asthma, but it is significant to note that Datura is not often given internally by natives. The Malays mix leaves with wine or powdered rice and saffron, and apply them externally for various pains and swellings. They will heat them over a torch until smoked, and then apply them as a poultice over the spleen in intermittent fever. The root is powdered and applied to the gums in order to relieve the pain of toothache. The flowers are dried and roughly powdered with or without the leaves and rolled into cigarettes for the relief of asthma.

The green fruit is pounded and applied to carbuncles in Guiana. The warm leaves are applied topically in sciatica.

In the Gold Coast, the leaves are crushed, mixed with oil and used as an antidote for poisonous insect bites, such as those of tarantula spiders.

The plant is now widespread as a weed in South Africa. It is much used as a popular medicine, and is of considerable toxicological importance. The Xosas and Fingos use the leaf to blister the skin over inflammations where there is no open sore. The former apply the leaf for the relief of headache. Europeans apply a warmed pad of the leaf to painful and swollen parts, and a similar poultice to ingrowing tow-nails and to burns. In former times the fresh warmed leaf or the vapour of an infusion of the leaf was applied particularly to relieve the pain of rheumatism and gout. Europeans also make an ointment containing the juice of the leaf and young shoots for application to running sores. A poultice of the leaf was formerly applied to carcinomatous ulcers. The smoke from the burning leaf is inhaled for the relief of asthma and bronchitis. A European remedy for hæmorrhoids is to steam the part over boiling water containing the leaf. The fruit juice is applied to the scalp for falling hair and dandruff. The Zulus apply the powdered leaf to bruises and wounds in both man and animal, the application being thought to draw out pus and inflammation. They use it as a smoothing application to painful wounds and sores, and the Rhodesian natives have a similar use. In Southern Rhodesia, natives apply the fresh leaf to tropical ulcer. The Sutos use a decoction of the plant to bathe bruises and apply the leaf for headache.

The leaves and seeds of Indian, European and South African plants have been examined chemically (*Journ. Chem. Ind.;* 1902, 1910, 1912 . . . . *Bull. Imp. Inst.;* 1911, 1916).

Afghanistan: Datura, Kachola—; *Afrikaans:* Olieblaar, Olieneut, Pietjie Laporte, Stinkblaar—; *Adkim:* Mmofra dhweneain, Pepediawu—; *Arabic:* Janzelmathil—; *Ashanti:* Pepediawu—; *Bengal:* Sadadhutura—; *Brazil:* Estramonio, Figueira do inferno—; *Canarese:* Bilidattura, Biliyummatta, Dattura, Datturi, Dhattura, Dhustura, Duttura, Dutturi, Kariyummatta, Maddugunikke, Ummatta—; *Catalan:* Estramoni, Figuera infernal borda, Herba taupera—;

Chinese: Chan K'iue Tse, Tou K'iue Eul, Tsoui Sin Hoa—; *Danish:* Pigæble—; *Dutch:* Doornappel—; *English:* Apple of Peru, Devil's Apple, Devil's Trumpet, Dewtry, Jamestown Weed, Jimson Weed, Mad Apple, Stink Weed, Thorn Apple—; *Fingo:* umVumbangwe—; *French:* Chasse-taupe, Endormeuse, Endormie, Estramon, Herbe aux démons, Herbe des démoniaques, Herbe du diable, Herbe aux magiciens, Herbe des magiciens, Herbe aux sorciers, Herbe à la taupe, Hirare, Jusquiame du Pérou, Pomette, Pomme du diable, Pomme épineuse, Pomme du Pérou, Pomme de vallée, Put-put, Trompette du jugement—; *Ga:* Blorfongmetsho, Owura kofi—; *German:* Asthmakraut, Botschen, Dollkraut, Dornapfel, Krœtenmelde, Nagwart, Stechapfel, Taternkraut, Tobkraut, Tollkraut, Zigeunerkraut—; *Greek:* Strychnos manikos—; *Hungarian:* Maszlag, Tsattanto—; *Italian:* Imbutone blanco, Noce spinosa, Pomo spinoso, Stramonio—; *Languedoc:* Darboussiero—; *Loralai:* Shinah azghi—; *Malayalam:* Matulam, Ummam, Ummata—; *Mexican:* Tlaplatl—; *Norwegian:* Piggeple—; *Persian:* Nanulah, Tatulah—; *Polish:* Psinki—; *Portuguese:* Estramonia, Figueira do inferno—; *Punjab:* Dattura, Tattur—; *Roumanian:* Bolandarita, Ciuma faie—; *Russian:* Durman, Durnishnik—; *Sanskrit:* Devika, Dhattura, Dhurta, Dhurtakrit, Dhustura, Dhuttura, Ghantapushpa, Ghantika, Haravallabha, Kahalapushpa, Kalama, Kanaka, Kanakaohaya, Kantaphala, Khala, Kharadushana, Kharjhugna, Kitava, Madakara, Madana, Madanaka, Mahamohi, Mahashatha, Matula, Matulaka, Matta, Mohana, Purimoha, Savisha, Shaiva, Shatha, Shivapriya, Shivashekhara, Shyama, Turi, Unmatta, Unmattaka—; *South Africa:* Apple Peru, Devil's Apple, Devil's Trumpet, Dewtry, Fireweed, Jamestown Lily, Jamestown Weed, Jimson Weed, Mad Apple, Stinkweed, Stinkwort, Thornapple, White Stinkweed, White Stramonium—; *Spanish:* Estramonio, Higuera loca, Trompetilla—; *Suto:* Mphufi, Lethsowe, Lethsowi—; *Swedish:* Spikklubba—; *Tamil:* Emanamam, Simaiyumattai, Turutturam, Umattai, Vellumattai—; *Telugu:* Dutturamu, Tellavummetta, Ummetta—; *Tonga:* Zabazaba—; *Tulu:* Umbe—; *Turkish:* Tatule—; *Urdu:* Dhatura—; *Uriya:* Dhutura, Sukladhutura—; *Xosa:* umHlavuthwa—; *Zulu:* iLogi, iYoli—.

2. **Datura fastuosa** Linn. Syst. Nat. ed. 10 (1759) 932; Wight Ic. t. 1396.—PLATE 685.

Annual; stem stout, 30-60 cm. high, somewhat zigzag, rather succulent, softly pubescent, divaricately branched. Leaves 7.5-15 by 3.2-7.5 cm., ovate, acute, entire or with a few large teeth or lobes, usually covered with a fine mealy pubescence (sometimes nearly glabrous), glaucous green above, paler beneath, usually rounded and very unequal at the base; main nerves conspicuous, usually about 8 on one side of the midrib, 6 at the other; petioles 2.5-5 cm. long. Flowers purple outside, usually white inside, often double, solitary; pedicels short, stout, pubescent. Calyx reaching sometimes 9 cm. long, finely pubescent; teeth 1.3-2 cm. long, triangular, very acute. Corolla 18 cm. long or even more, often 10-12.5 cm. across at the mouth; limb with 5 or 6 short acute deltoid lobes and a short tail in the middle of each intervening sinus. Stamens about equalling the corolla-tube; filaments slender; anthers 1 cm. long, oblong, obtuse. Ovary clothed with soft prickles; stigma 2-lobed. Capsules nodding, on curved pedicels 3.2 cm. diam., subglobose, supported on the reflexed base of the calyx, green, covered all over with numerous straight sharp prickles. Seeds numerous, closely packed, compressed, 4 mm. diam., nearly smooth, yellowish brown.

Distribution: Throughout India in gardens and on waste ground.—Throughout the tropics.

The therapeutic properties are the same as those of *D stramonium* (Ayurveda, Yunani).

The seeds, leaves and fresh juice are narcotic, anodyne and antispasmodic. They are more powerful than those of *D. alba* both of which, however, are used in the treatment of mania, epilepsy, and obstinate headache.

Great and immediate relief has been seen to follow smoking a small quantity of the leaves of this species in cases of asthma.

The juice of the fresh leaves, or a poultice of them, is useful in painful swellings, ophthalmic pain, and ear-ache.

In Mysore, the juice of the leaves is given once daily with curdled milk for gonorrhœa.

A few seeds with the root of *Anacyclus pyrethrum* and cloves are chewed as an aphrodisiac.

The seeds are a favourite poison for criminal purposes.

In Ceylon, the roots are used in bites from mad dogs; they are supposed to cure insanity. The whole plant is dried and smoked as tobacco for asthma.

The leaves enter into the composition of snake remedies (Yogaratnakara). Ground and made into a paste they are applied to scorpion-stings (Subodhavaidyaka). They are no antidote to either snake-venom (Mhaskar and Caius) or scorpion-venom (Caius and Mhaskar).

Indian and European plants have been examined chemically (*Journ. Chem. Soc.*, 1899; *Bull. Imp. Inst.*, 1911).

Arabic: Jouzmasameasvad, Jouzmasleasvad—; *Behar:* Khunuk—; *Bengal:* Kaladhutura—; *Betsileo:* Kinanakoho—; *Bombay:* Kaladhatura—; *Burma:* Padaingame, Padayinkatte—; *Canarese:* Biliyummatta, Dattura, Datturi, Dhattura, Dhustura, Duttura, Dutturi, Kanaka, Kariyummatta, Maddugunike, Ummatta—; *Deccan:* Kaladhatura, Udahdhatura—; *Egypt:* Kechubuh—; *English:* Black Datura, Purple Datura—; *Gujerati:* Kaladhatura, Kalodhatura, Kalodhaturo—; *Hindi:* Kaladhatura—; *Hova:* Maimbobe, Ramiary, Voandramiary—; *Kedah:* Terong pungah—; *Malay:* Kechubong hitam—; *Malayalam:* Kariyummatta, Karummattu, Madanam, Nilayummata, Ummata—; *Marathi:* Kaladhotra—; *Persian:* Guzgiah, Kaizmasalesiyah, Kouzkunaesiyah, Taturahesiyah—; *Peshawar:* Toradana—; *Sanskrit:* Bhranta, Dhurta, Kalahemaka, Kanaka, Kanakakhanthphala, Kanakapushpa, Kanakonmatta, Kitava, Krishnadhattura, Krishnapushpa, Krishnonmatta, Kruradhattura, Kruradhurta, Madana, Mahasatha, Matula, Mohana, Rajadhattura, Rajadhurta, Sashiva, Satha, Shiva, Shivapriya, Shivashekhara, Shyama, Snigda, Unmatta, Unmohin, Visharati—; *Santal:* Dhatura—; *Sind:* Dhaturo—; *Sinhalese:* Antenna, Attana, Kaluantenna, Kaluattana—; *Spanish:* Tunica de Cristo—; *Tagalog:* Talamponai na itim—; *Tamil:* Ayigam, Karuvumattai, Emanamam, Madumattai, Maiyal, Mattadi, Mattai, Mattam, Ponnumattai, Samadu, Turam, Umattai, Udavumattai, Vellaiyumattai, Vellumattai—; *Telugu:* Matulaputrakamu, Dutturamu, Nallavum-

metta, Tellavummatta, Ummetta—; *Tulu:* Kariyumbe, Umbe—; *Uriya:* Jambunodo, Khorodushono—; *Zhob:* Datura—.

3. **Datura alba** Nees in Trans. Linn. Soc. XVII, 73; Wight Ic. t. 852.—PLATE 686 (under *D. fastuosa* var. *alba*).

Stem 1.5-1.8 m. high, herbaceous or slightly woody below. Leaves stalked, 15-18 cm. long, ovate, acuminate, repand-dentate, unequal at the base, glabrous, bright green. Flowers white or cream-coloured erect, shortly stalked. Calyx about 3.2 cm. long, deeply 5-toothed; teeth triangular-lanceolate, acuminate. Corolla 11.5-12.5 cm. long, 5-plicate, puberulous outside, limb obscurely 5-lobed, lobes cuspidate. Capsule globose, spreading or nodding, aculeate.

Distribution: Throughout India.—China. Very likely of Asiatic origin.

The seeds are useful in bites of mad dogs, purulent discharges from the ear, elephantiasis, indigestion; they prevent conception (Ayurveda).

In Hindu medicine, the root of *D. alba* is boiled in milk, and this milk is administered with clarified butter and treacle in insanity. The seeds, leaves and roots are considered useful in insanity, fever with catarrhal and cerebral complications, diarrhœa, skin diseases, lice, etc.

Epithems of the bruised leaves, or embrocations formed by macerating the bruised seeds in any bland oil, are often very effectual in allaying the pain in rheumatic swellings, nodes, boils, and tumours.

Annam: Ca doc duoc—; *Arabic:* Jouzmasalabyaz, Jouzmaslea-byaz—; *Bengal:* Dhutura—; *Betsileo:* Kinanakoho—; *Burma:* Paduyinphiu—; *Canarese:* Biliyumatta, Ummattegida—; *Chinese:* Man T'o Lo—; *Deccan:* Ujladhaturah—; *English:* White Datura—; *Gujerati:* Dhaturo, Dholodhaturo—; *Hindi:* Sadahdhatura, Safed-dhatura—; *Hova:* Maimbobe, Ramiary, Voandramiary—; *Kashmir:* Dather—; *Kedah:* Terong pungah—; *Kwang Tung:* Lao Iang Hoa—; *La Reunion:* Stramonium—; *Malay:* Kechubong puteh—; *Malayalam:* Kariyummata, Karummattu, Madanam, Nilayummata, Ummata—; *Marathi:* Dhotara, Pandradhotara—; *Pampangan:* Talamponai—;

Persian: Kouzmasalesafed, Taturahesafed—; *Porebunder:* Dhanturo, Dolodhanturo—; *Sanskrit:* Dhatura, Dhurta, Kanaka, Kanakakauthphala, Kanakapushpa, Kanakonmatta, Kitava, Madana, Matula, Mohana, Shatha, Shivapriya, Shivashekara, Shyana, Svetadhatura, Unmatta, Unmohin—; *Sinhalese:* Suduattana—; *Tagalog:* Talamponai—; *Tamil:* Emanamam, Vellaiyumattai, Vellummattai—; *Telugu:* Tellavummatta—; *Tulu:* Umbe—; *Visayan:* Catchibong, Catchubung, Tatchubong—.

4. **Datura metel** Linn. Sp. Pl. (1753) 179.

Whole plant densely clothed with greyish tomentum. Stem erect, 0.9-1.2 m. high, stout, herbaceous, terete. Leaves 15-20 cm. long, ovate-lanceolate or broadly ovate, acute or acuminate, unequal at the base and often cordate, entire or repand-dentate, densely tomentose on both surfaces and generally glandular, petioles 6.3-9 cm. long; peduncles at first erect, afterwards nodding. Calyx about 7.5 cm. long, inflated towards the middle, persistent and reflexed in fruit; teeth lanceolate, acuminate, unequal. Corolla about twice as long as the calyx, white tinged with green below, pubescent outside, limb 10-toothed. Capsule globose, nodding, covered with long rather slender spines.

Distribution: Supposed to have spread from S. America to all other parts of the world. Found in the N.-W. Himalaya, about Madras.

In India, it is used in the same ways and for the same purposes as *D. alba.*

Digested in wine the long white corollas form a tincture used as an anæsthetic in China. A lotion is made from them which reduces eruptions on the face and swellings of the feet.

In Cambodia, the flowers are used in asthma and the fruits in earache.

In Guinea, the pounded leaves are applied to swellings, tumours, and rheumatic pains. A decoction of the seeds is used for diseases of the eye.

In the Gold Coast, it is commonly pounded and used to smear the floors of houses to kill lice and other vermin, especially the dreaded " jiggers ".

The seeds contain both hyoscyamine and scopolamine (*Journ. Chem. Ind.;* 1911). The Indian plant has also been examined chemically (*Bull. Imp. Inst.;* 1911).

Ashanti: Aweawu, Pepeadiwuo—; *Cambodia:* Slak—; *Canarese:* Dattura, Datturi, Dhattura, Dhusturi, Duttura, Dutturi, Kanaka, Madana, Maddugunike, Matula, Unmatta—; *Chinese:* Nao Yang, Yang Chi Chu—; *East Hausa:* Sutura—; *English:* Downy Datura—; *Gold Coast:* Angel's Trumpets—; *Hausa:* Zakami—; *Katsina:* Babba jibji, Babba juji—; *Malaya:* Nao yang hua, Now yang, Now yang fah—; *Malayalam:* Ummam, Ummata—; *Malinke:* Kidiganian—; *Malta:* Downy Thorn-apple, Stramoniu abjad—; *Philippines:* Talon-punay—; *Sanskrit:* Dhustura—; *Sokoto:* Babba jibji, Babba juji—; *Spanish:* Metel de los arabes—; *Tagalog:* Tarumpunia—; *Tamil:* Adukkumattai, Madulam, Vellaiyummattai, Vellummattai—; *Telugu:* Tellavummetta—; *Uriya:* Dhotura, Dhutura—; *Visayan:* Catchu-bung—.

SCOPOLIA Jacq.

Erect, glabrescent herbs. Leaves entire. Pedicels axillary, solitary. Flowers lurid, nodding. Calyx large, campanulate, sub-truncate or shortly lobed; in fruit enlarged, overtopping the capsule. Corolla widely campanulate, plaited; lobes short, scarcely imbricate. Stamens 5, attached near the base of the corolla; filaments filiform, somewhat dilated near the base; anthers ovate, dehiscing longitudinally. Ovary sub-2-celled; style linear, stigma thick dilated. Capsule globose, circumsciss above the middle. Seeds many, reni-form, granulate; embryo peripheric.—Species 4.—Europe, Asia.

S. japonica Max. is used medicinally in Japan.

1. **Scopolia lurida** Dunal. in DC. Prodr. XIII, pt. 1, 555.—PLATE 687A.

An erect glabrescent herb. Branches 0.9-1.8 m., sparingly divided, rusty-tomentose when young, later puberulous or glabrate. Leaves 20 by 7.5 cm., ovate-lanceolate, acute at both ends, ultimately glabrate; petiole 1.3 cm. Peduncles 2.5 cm. Calyx in flower 1.7 cm., in fruit attaining to 5 by 3.2 cm., lobes short, irregular; fruiting

calyx rather reticulated. Corolla 3.2 by 2 cm., lurid yellow or greenish purple. Ovary 2-celled, 1-celled near the top. Capsule 2 cm., lid 1-celled, remainder 2-celled. Seeds 2 mm.

Distribution: Nepal and Sikkim, up to 5,000 ft.

A tincture of the leaves, in the proportion of one ounce to eight ounces of alcohol, administered produces dilation of the pupil.

Physochlaina G. Don.

Erect, nearly glabrous herbs. Leaves petioled, subentire. Corymb terminal. Calyx campanulate, lobes 5 short; in fruit elongated, overtopping the capsule. Corolla elongate; lobes 5, short, imbricate in bud. Stamens attached at the middle of the tube, filaments filiform; anthers ovate, longitudinally dehiscent. Ovary 2-celled; style linear, stigma obscurely 2-lobed. Capsule 2-celled; circumsciss above the middle. Seeds very many, compressed; embryo peripheric.—Species 5.—Central Asia.

The leaves have the property of dilating the pupil.

1. **Physochlaina praealta** Hook. f. Bot. Mag. t. 4600, in nota.—Plate 687C.

An erect, nearly glabrous, herb. Stamens 0.6-1.2 m., corymbose upwards. Leaves 10-15 by 7.5 cm., irregular, ovate-oblong, sinuate, base cuneate or cordate on the same branch. Petiole 2.5-10 cm. Corymb 5-20 cm. diam., compound, lax, viscid-pubescent. Flowers all pedicelled; pedicels 0.6-3.8 cm. Calyx in flower 8 mm., lobes 3 mm. lanceolate; in fruit 4.5 by 0.8 cm., striate. Corolla 3.2 cm. by 5 mm., tubular-funnel-shaped in the majority of wild examples, sometimes shorter, in the cultivated examples wider, subcampanulate. Stamens and style equalling the corolla, or 8 mm. longer, distinctly exserted in nearly all wild examples. Capsule 1.3 cm. diam. Seeds 2 mm. diam., scrobiculate-reticulate.

Distribution: Kashmir, 12,000—15,500 ft.

In the hills the leaves are applied to boils, and are also said to be poisonous, the mouth swelling from their touch, and the head and throat being affected when they are eaten.

Punjab: Bajarbang, Dandarwa, Khardag, Langtang, Nandru, Sholar—.

HYOSCYAMUS Linn.

Erect coarse herbs. Leaves sinuate-dentate or pinnatifid, rarely quite entire. Flowers usually unilateral, sessile or pedicellate, the lower axillary, solitary, the upper arranged in a spike or scorpioid raceme; upper floral leaves bract-like. Calyx tubular-campanulate or urceolate, shortly 5-fid, enlarged in fruit, including the capsule, strongly ribbed. Corolla infundibuliform; limb oblique, 5-fid; lobes more or less unequal, imbricate in bud. Stamens attached about the middle of the corolla-tube, usually exserted; anthers dehiscing longitudinally. Ovary 2-celled; ovules numerous; style filiform; stigma subcapitate. Capsule perfectly or almost perfectly 2-celled, circumscissile above the middle. Seeds more or less compressed, usually scrobiculate; embryo peripheric.—Species 11.—N. Africa, Europe, Asia.

1. More or less hairy and viscid with a disagreeable heavy odour .... 1. *H. niger.*
2. Stem branched, erect, firm, fistulose, branches clothed with soft clammy woolly hairs .... 2. *H. muticus.*
3. Appressedly pubescent. Stem single or strictly branching above and leafy .... 3. *H. reticulatus.*

Powerfully narcotic.

H. albus Linn. is used medicinally in Europe and Brazil, *H. niger* Linn. in Europe, China, and Brazil.

OFFICIAL:—*H. niger* Linn.: the leaves in Austria, Belgium, Denmark, Germany, Great Britain, Holland, Hungary, Italy, Japan, Norway, Russia, Spain, Sweden, Switzerland, Turkey, United States; the leaves and the seeds in France; the plant and the seeds in Portugal.

H. muticus Linn. is officially recognized in Great Britain as a source of atropine.

1. **Hyoscyamus niger** Linn. Sp. Pl. (1753) 179.—PLATE 687B.

An erect, more or less hairy and viscid herb with a disagreeable, heavy odour; stem robust, 0.3-0.9 m. Radical leaves spreading,

stalked, oblong-ovate, 15-20 cm., coarsely sinuate-toothed. Stem-leaves smaller, sessile, ovate, irregularly pinnatifid, passing into bracts. Flowers pale yellow-green, veined with purple, darker in the centre, nearly sessile, lower ones in the forks of the branches, upper solitary in the axils of leaf-like bracts, forming long, 1-sided spikes rolled back at the top before flowering, ultimately becoming elongated and straight. Calyx 2 cm.; tube ovoid; limb funnel-shaped, 5-toothed. Corolla funnel-shaped; limb spreading, 2.5-3.2 cm. across, lobes 5, broad, short, slightly unequal. Stamens protruding. Ovary 2-celled; style longer than the stamens. Capsule 1.3 cm. diam., enclosed in the globose tube of the enlarged calyx, lower part membranous, top hard, rigid, opening transversely along the constriction between the 2 portions.

Distribution: From Kashmir to Garhwal, 8,000—11,000 ft.—Europe, W. and N. Asia.

The seeds have a sharp pungent taste; tasty, heating; stomachic, astringent to the bowels; toxic; cause "vata"; cure "kapha" (Ayurveda).

The leaves are expectorant; used as a gargle for toothache, bleeding of the gums; a useful application for pain in the liver, gouty swellings, inflammation of the breasts and the testes.—The seeds are bitter; aphrodisiac, hypnotic, hæmostatic, depilatory, astringent to the bowels; useful in nasal troubles, watering of the eyes, ophthalmia, earache, fevers, headache, pain in the joints; the smoke is useful in scabies, caries of the teeth, bronchitis; hypnotic (Yunani).

The leaves are anodyne, narcotic, mydriatic. They are principally employed in irritable conditions, and nervous affections.

They are also used in asthma, whooping cough, etc., as a sedative and as a substitute for Opium, where this is inadmissible as in children's complaints.

A comparative study of the chemical constituents of Indian and European plants has been carried out (*Bull. Imp. Inst.;* 1911).

Arabic: Bazrulbanj, Sikram—; *Bengal:* Khorasaniajowan—; *Bombay:* Khorasaniowa—; *Brazil:* Meimendro negro—; *Canarese:* Khurasanivadakki, Khurasanivoma—; *Catalan:* Herba caixalera,

Herba de la Madre de Deu, Jusquiam, Tobaco bort, Tobaco de paret—; *Chinese:* Iang Tche Tchou, Lang Tang, Lao Iang Hoa—; *Danish:* Eulme, Honsebane—; *Deccan:* Khurasaniajwan—; *Dutch:* Bilsenkruid—; *English:* Belene, Brosewort, Chenile, Black Henbane, Henbane, Henbell, Henkam, Hogsbean, Loaves-of-bread, Sickly-smelling Henbane, Stinking Roger, Symphonica—; *French:* Careillade, Clavelée, Fève à cochon, Fève de porc, Hannebane, Henbane, Hennebane, Hennebone, Herbe aux engelures, Herbe a la teigne, Fève de pourceau, Jusquiame noire, Mort aux poules, Porcelet, Potelée, Tue poule—; *German:* Dulldill, Dullkraut, Dulldaeg, Huehnertod, Saukraut, Schlafkraut, Schwartzes Bilsenkraut, Swartendaeg, Teufelskraut, Tollwurz, Wolfdistel, Zankkraut, Zankteufel, Zigeunerkraut—; *Greek:* Hyoskyamos—; *Gujerati:* Khorasaniajmo, Khorasaniajvan—; *Hindi:* Khurasaniajvayan, Khurasanijamani, Khurosaniyamani—; *Italian:* Herba apollinaris, Fava porcina, Giusquiamo nero—; *Languedoc:* Careillada—; *Marathi:* Khorasanivova—; *North-Western Provinces:* Khorasaniajwain—; *Persian:* Bang, Bazrulbang—; *Polish:* Bielun—; *Portuguese:* Meimendro, Meimendro negro, Miemendro, Velheno, Yosciamo—; *Punjab:* Bangidewana, Bazrbang, Damtura, Dandura, Datura, Dentura, Sura—; *Roumanian:* Masalarita, Masalariu, Nebunarita—; *Russian:* Byelena—; *Sanskrit:* Dipya, Kuberakhya, Madaka, Madakarini, Mani, Parasikaya, Shyama, Tivra, Turushka, Yavani—; *Simla:* Telingchi—; *Sind:* Damtura—; *Spanish:* Beleno negro, Veleno—; *Swedish:* Bolmort, Honsable—; *Tamil:* Kurasaniyomam—; *Telugu:* Kurashanivamam, Kurinjivamam—; *Urdu:* Khorasaniyajwan—.

2. **Hyoscyamus muticus** Linn. Mant. (1767) 45.—Plate 688.

Herbaceous, 0.3-0.9 m. high; root creeping extensively; stem branched, erect, firm, fistulose, leafy, obsoletely angular; branches clothed with soft clammy woolly hairs. Cauline leaves scattered, 10-20 by 5-12.5 cm., the lower the largest, ovate-oblong or subrhomboid, acute, thick, entire or coarsely sinuate-dentate, pubescent or woolly, base acute; petioles 1.3-7.5 cm. long, very broad. Flowers unilateral in 10-30-flowered spicate racemes, scorpioid when young,

much elongate (15-30 cm.) in age; pedicels of the lower flowers sometimes nearly as long as the calyx, those of the uppermost flowers scarcely 2.5 mm. long. Calyx strongly nerved, urceolate, 1.7-2.5 cm. long in flower, enlarged in fruit; teeth triangular-oblong, acute, not spreading, often unequal. Corolla infundibuliform, 2.5-3.8 cm. long; tube gradually enlarged into the limb, about equalling the calyx, greenish; limb pink outside, darker pink inside, veined, often with dark purple spots at the base; lobes short, sub-obricular, subequal. Stamens unequal, the 3 lower shorter, about equalling the corolla, the 2 upper longer than the corolla; filaments pubescent at the base; anthers 4 mm. long, sagittate at the base. Ovary glabrous or faintly pubescent; style longer than the stamens, glabrous. Capsules 10 by 6 mm., oblong, rounded at the apex, circumscissile near the top. Seeds very numerous, 6 mm. diam., discoid, tuberculate, yellow.

Distribution: W. Punjab, Waziristan, Sind, Baluchistan.—Afghanistan, westwards to Egypt.

It is used in India as an intoxicant.

Its powerfully poisonous properties are well known, and it is stated to be smoked in small quantities by debauched faquirs, and to be used also for criminal purposes. The chief symptoms produced by it are dryness and constriction of the throat, and furious delirium (Stocks).

Baluchistan: Koheebhang, Kohibhang—; *English:* Indian Henbane—; *Kharan:* Koh bana—.

3. **Hyoscyamus reticulatus** Linn. Sp. Pl. ed. II, 257.

Annual or biennial, appressedly pubescent. Stem stout, single, or strictly branching above and leafy. Leaves oblong or lanceolate, more or less deeply pinnatifid, the radical ones attenuate into a short petiole, the stem-leaves sessile, oblong. Flowers sessile forming leafy, unilateral, scorpioid spikes which become finally elongate and straight. Floral leaves oblong or lanceolate, entire, acute, exceeding the flowers. Fruiting calyx erect, not constricted above the middle, teeth patent-recurved, spinose. Corolla purple-violaceous, reticulate. Stamens slightly exceeding the throat; style exserted.

Distribution: Baluchistan.—Asia minor, Armenia, Syria, Mesopotamia, Transcaucasus, Persia.

At Burj in Toba Achazzai, the seed is applied in cases of toothache, and the smoke of seeds put into the fire is inhaled (Hughes-Buller).

Hindubagh: Kohibhang—; *Pushtu:* Bhang—; *Quetta:* Kohibhang, Phulnatutibai—.

NICOTIANA Linn.

Erect, viscidly-pubescent, herbs, shrubs, or trees. Leaves entire or sinuate. Panicles terminal, or racemes compound, subterminal. Calyx ovoid or tubular, 5-fid. Corolla funnel-shaped; lobes 5, induplicate in bud. Stamens attached in the lower part of the corolla-tube, filaments filiform; anthers ovate, dehiscing longitudinally. Ovary 2-celled; style filiform, stigma shortly 2-fid. Capsules 2-, rarely sub-4- celled, 2-valved to the middle, valves often again splitting. Seeds very many, small, scarcely compressed; embryo nearly straight.—Species 45.— America, Polynesia.

1. Leaves large, oblong or elliptic, base cuneate .... 1. *N. tabacum.*
2. Leaves ovate, base obtuse or cordate .... 2. *N. rustica.*

The genus is a powerful stimulant narcotic, used as an excitant and a sedative.

N. rustica Linn. and *N. tabacum* Linn. are used medicinally wherever found. *N. alata* Link. and Otto is similarly used in Persia and *N. langsdorffii* Schrank. in Brazil.

The leaves of *N. Tabacum* Linn. (*N. Havanensis Lag.*) are official in Portugal.

1. **Nicotiana tabacum** Linn. Sp. Pl. (1753) 180.--PLATE 689A.

An erect glandular-pubescent herb with terete stem. Large oblong-lanceolate acuminate sessile leaves, the lower semiamplexicaul and decurrent, and rosy or reddish pedicelled bracteate flowers 4-5 cm. long in many-flowered, usually panicled racemes. Calyx 1-1.3 cm. oblong with lanceolate very acute unequal lobes. Corolla about 1.8 cm. diam., with an inflated throat and acute spreading lobes,

outside lanuginous. Capsule 1.5-1.8 cm., a little longer than the calyx, which is slightly accrescent.

Distribution: A native of America; cultivated in all tropical countries.

The leaves have a sharp bitter taste; heating, laxative, tonic, emetic, carminative, anthelmintic; useful in bronchitis, asthma, caries of the teeth, skin diseases, scorpion bite, inflammations; cause bad eyesight (Ayurveda).

The leaves have a sharp bitter bad taste; poisonous to fish; useful in caries of the teeth, bronchitis, sores, foul nose, scabies, wounds, tubercular glands of the neck, dimness of sight; the smoke is constipative, disinfectant, a mental stimulant; the water from the hookah is diuretic; the black oil in the pipes heals sinuses, cures night blindness, and purulent ophthalmia (Yunani).

The leaves are narcotic, sedative, emetic. An ointment, made by simmering the leaves in lard, has been employed in curing old ulcers and painful tumours.

In Guiana, the leaves warmed and dipped in oil are applied to fresh wounds. An infusion is given as an enema. The smoke is considered excellent for strangulated hernia.

In the Gold Coast, the leaves are softened over the fire and then mixed with Shea Butter or vaseline. The ointment is then rubbed over the chest in lobar cases. The pains yield to its action and ameliorate the difficult breathing of such cases.

The dried leaf is used as a styptic by both Europeans and Natives in South Africa. The juice from a tobacco pipe is used as one of the native remedies to be rubbed on the anus in cases of typhoid fever. It is applied to snake and insect bites and to rid the skin of ticks—it is apparently toxic to ticks and causes them to drop off.

The leaf is a popular remedy in India for scorpion-sting; but it is useless in both the symptomatic and the antidotal treatments (Caius and Mhaskar).

Arabic: Bujjirbhang, Tanbak, Yuli—; *Ashanti:* Taa, Tawa—; *Bara:* Lobara, Tsitata—; *Bengal:* Tamak—; *Betsileo:* Tabaka—;

1.3 cm. diam., glabrous with rounded or obtuse lobes. Capsule 1.3 cm. subglobose obtuse, slightly exserted from the calyx.

Distribution: Cultivated in the W. Punjab, Baluchistan and other parts of India.

The properties are the same as those of *N. tabacum.*

The Sutos use the leaf for smoking and as a snuff. The snuff is applied to children with cold in the head as a sternutatory.

Behar: Kalkatiyatamaku—; *Bengal:* Bilætitamaku—; *French:* Priapée, Tabac du Mexique, Tabac femelle, Tabac à feuilles rondes, Petit tabac, Tabac sauvage—; *German:* Bauerntabak, Tuerkischer Tabak—; *North-Western Provinces:* Kalkattiatamaku—; *Punjab:* Chilassitamaku, Kakkartamaku, Kandaharkakkar, Kandaharitamaku—; *Suto:* Koæ—.

SCROPHULARIACEAE.

Herbs or shrubs (rarely trees), often semi-parasitic, rarely quite parasitic on roots. Leaves all or the lower only opposite, rarely all alternate or whorled; stipules 0. Flowers hermaphrodite, usually irregular; inflorescence centripetal or composite. Calyx inferior, usually persistent, 5- (rarely 4-) merous. Corolla hypogynous, more or less 2-lipped or occasionally personate, 4-5-lobed. Stamens usually 4 with or without a rudimentary 5th (staminode), less commonly 2 or 5; anthers variously shaped, 1-2-celled, the cells distinct or more or less confluent. Disk annular, cupular, or glandular. Ovary superior, usually 2-celled; ovules many, rarely few, or only 2 in each cell, anatropous or amphitropous; style simple; stigma capitate, or dilated, or 2-lobed, or 2-lamellate. Fruit capsular (rarely baccate); placentæ on a free central axis or attached to the margins of the valves. Seeds small, of various shapes; hilum lateral or ventral; albumen fleshy (rarely 0); embryo straight or curved.—Genera 200. Species 2,600.—Cosmopolitan.

A. Leaves all alternate. Inflorescence simply centripetal. Corolla with the 2 upper lobes exterior in bud
  1. Stamens 5 .... VERBASCUM.
  2. Stamens 4 .... CELSIA.

B. Corolla tubular, tube saccate or spurred. Capsule opening by pores. Inflorescence uniform, centripetal
  1. Corolla spurred. Anther-cells distinct .... LINARIA.
  2. Corolla small, subsaccate. Anther-cells confluent above .... SCHWEINFURTHIA.

C. Calyx 5-partite (except in LINDENBERGIA). Stamens 4, included. Anther-cells separate
  1. Calyx campanulate, 5-fid. Capsule 2-valved .... LINDENBERGIA.
  2. Calyx-segments equal. Stamens all perfect. Seeds terete .... STEMODIA.
  3. Calyx-segments equal. Stamens all perfect. Seeds angled ... LIMNOPHILA.

D. Calyx 5-partite, imbricate, Stamens included. Anther-cells contiguous. Capsule 2-4-valved
  Calyx-segments unequal. Stamens 4 .... MONIERA.

E. Calyx usually 5- toothed or -partite. Stamens 2 upper, usually in the tube, 2 lower in the throat of the corolla, perfect or reduced to staminodes. Anthers conniving or cohering in pairs
  1. Calyx-segments 5, broad. Stamens 4, all perfect .... ARTANEMA.
  2. Calyx flat, segments 4, two outer very large .... CURANGA.
  3. Calyx tubular, plaited or winged, 3-5-toothed or 2-lipped .... TORENIA.
  4. Calyx-segments 5, free or connate. Stamens 4, all perfect .. VANDELLIA.
  5. Calyx-segments 5, narrow. Stamens 2, both perfect. Capsule long .... BONNAYA.

F. Corolla subrotate, lobes 4-5 or more. Stamens as many as the lobes or fewer by one, equal. Anthers sagittate or horse shoe-shaped
  Calyx 4-5-partite. Corolla 4-fid. Erect herb .... SCOPARIA.

G. Corolla rotate, or tube campanulate or cylindric, 4-5-lobed. Stamens 2 or 4, exserted, equal. Anthers distant. Leaves alternate or radical
  1. Flowers dimorphic. Stamens 4. Leaves radical .... PICRORRHIZA.
  2. Corolla-tube short. Stamens 2. Leaves (or the lower) opposite .... VERONICA.

H. Calyx tubular or subcampanulate. Corolla-tube slender, limb spreading. Anthers 1-celled
  Calyx tubular, 5-toothed. Corolla-tube abruptly incurved .... STRIGA.

I. Calyx various. Upper lobes of corolla-tube interior in bud
  Calyx campanulate, 5-toothed. Anthers with 1 cell stipitate and empty .... SOPUBIA.

J. Corolla 2-lipped. Upper lip erect, concave or hooded. Anther-cells distinct
  Calyx split in front, 2-5-toothed. Leaves alternate or whorled .... PEDICULARIS.

This order exhibits a great diversity of therapeutic properties. Some of the members are sedative and emollient; others are bitter and tonic; others emetic and cathartic; others again acrid and narcotic.

The Order is rich in glucosides and bitter principles—digalen, digitalin, digitonin, digitosaponin, digitoxin, gitalin, gitin, gitonin, gitoxin, gratiolin, linarin, curangægenin, curangin.

OFFICIAL :—*Digitalis ambigua* Murray (Russia); *D. purpurea* Linn. (Austria, Belgium, Denmark, France, Germany, Great Britain, Holland, Hungary, Italy, Japan, Norway, Russia, Spain, Sweden, Switzerland, Turkey, United States), —var. *tomentosa* Brot.=*D. tomentosa* Hoffmseg. and Link (Portugal).

Gratiola officinalis non Linn.=*G. linifolia* Vahl (Portugal).

Verbascum crassifolium Hoffmseg. and Link, *V. macranthum* Hoffmseg. and Link (Portugal); *V. phlomoides* Linn. (Austria, Denmark, Germany, Russia, Switzerland, Turkey); *V. simplex* Hoffmseg. and Link, *V. sinuatum* Linn. (Portugal); *V. thapsiforme* Linn. (Denmark).—Schrad. (Belgium, France, Germany, Portugal, Russia, Switzerland, Turkey); *V. thapsoides* Linn. (Portugal); *V. thapsus* Linn. (Belgium, Denmark, Portugal).

Veronica Beccabunga Linn. (*V. limosa* Lejeune) in Portugal; *V. officinalis* Linn. (Denmark, France, Portugal).

VERBASCUM Tourn. ex Linn.

Erect, tomentose or woolly, usually tall herbs. Leaves all alternate. Flowers in simple or panicled terminal racemes or spikes, ebracteate, yellow, rarely white or red. Calyx 5- lobed or -partite, lobes imbricate. Corolla rotate; lobes 5, broad, the upper exterior in bud. Stamens 5 (very rarely 4), filaments all or the 3 upper bearded; anthers transverse or oblique, cells confluent. Style-top dilated, stigma simple. Capsule globose, oblong, or ovoid, septicidal; valves separating from the axis. Seeds numerous, rugose, not winged; embryo straight.—Species 210.—N. temperate regions of the Old World.

The leaves are demulcent and emollient, slightly bitter and astringent; the flowers are emollient and bechic; the seeds are slightly acrid and narcotic.

The following species are used medicinally in Europe—*V. blattaria* Linn., *V. bœrhaavii* Linn., *V. lychnitis* Linn., *V. montanum*

Schrad., *V. nigrum* Linn., *V. phlomoides* Linn., *V. pulverulentum* Willd., *V. thapsiforme* Schrad., *V. thapsus* Linn.—.

OFFICIAL :—The leaves and flower heads of *V. crassifolium* Hoffmseg and Link, *V. macranthum* Hoffmseg and Link., *V. simplex* Hoffmseg. and Link., *V. sinuatum* Linn., *V. thapsiforme* Schrad., *V. thapsoides* Linn. *V. Thapsus* Linn. in Portugal.

The flowers of *V. phlomoides* Linn. (Austria, Denmark, Germany, Russia, Switzerland, Turkey), *V. thapsiforme* Linn. (Denmark),— Schrad. (Belgium, France, Germany, Russia, Switzerland, Turkey), *V. Thapsus* Linn. (Belgium, Denmark).

1. **Verbascum thapsus** Linn. Sp. Pl. (1753) 1777.—PLATE 690.

An erect herb densely clothed with soft, yellow-grey, stellate hairs; stems robust, 0.9-1.8 m., winged with the prolonged leaf-bases. Leaves entire or nearly so; radical and lower stalked, ovate, 10-30 cm.; upper sessile, oblong-lanceolate, 15-45 cm. Flowers nearly sessile, yellow, 2-2.5 cm. diam., crowded in terminal spikes. Calyx 5-lobed. Corolla concave, woolly outside; tube very short; lobes 5, spreading, nearly equal, broad, obtuse. Stamens 5; filaments 3 short and hairy, 2 longer and glabrous. Stigma capitate. Capsule tomentose, ovoid.

Distribution: Temperate Himalaya, 6,000—11,000 ft., from Kashmir to Bhutan.—W. Asia, Europe.

The leaves are hot, dry; anodyne; narcotic to fish; useful in chest complaints, gout, rheumatism, diarrhœa, cough; used externally as an emollient (Yunani).

The leaves, flowers, and root are demulcent, astringent, and pectoral. Both leaves and flowers are useful in cases of pulmonary diseases, coughs, consumption, bleeding of the lungs and bowels.

In the Trans-Indus region the herb is much employed for the treatment of asthma and other pulmonary complaints. The leaves warmed, and rubbed with oil, are employed as an application to inflamed parts. The seeds are considered aphrodisiac and narcotic; they are used for poisoning fish.

In Bassahir, the root is given as a febrifuge.

In Europe and the United States of America, the thick woolly leaves are much valued as demulcents and emollients, not only in domestic medicine, but by practitioners. They are used in the treatment of catarrh and diarrhœa, and as an external application for hæmorrhoids.

In most part of Ireland, it is in great demand by sufferers from pulmonary consumption.

In Germany, a decoction of the root is given for cramps, and against the megrims of bilious subjects. The dried leaves, if smoked in an ordinary tobacco pipe, will completely control the hacking cough of consumption; they can be employed with equal benefit, when made into cigarettes, for asthma and for spasmodic coughs in general.

In England, a tincture is made from the fresh herb with spirit of wine, which has been proved beneficial for migraine of long standing, with oppression of the ears. Mullein oil is an admirable bactericide; it has been used with great success in diseases of the ear—suppurative inflammation of the inner ear, acute or chronic cases—. The same oil is an admirable remedy for children troubled with enuresis at night.

In many parts of Europe, the oil is a popular remedy for frostbites, bruises, and piles. A conserve of the flowers is employed against ringworm. Also a poultice made with the leaves is a good application to troublesome evils of the fundament.

The *British Medical Journal* of 27th January 1883, published an interesting paper from the pen of Dr. F. J. B. Quinlan of Dublin on the use of this plant in the treatment of pulmonary consumption. According to him, this plant which is a wild one in Ireland is a trusted popular remedy for that malady. After describing several cases in which this plant proved useful, he says :—"That it eases phthisical cough there can be no doubt. Its power of checking phthisical looseness of the bowels was very marked. It also gave great relief to the dyspnœa. For phthisical night sweats it is utterly useless."

Arabic: Adaneddubb, Mahizahraj—; *Catalan:* Blenera, Candelera, Cua de grilla, Tripo—; *Dutch:* Wollekruid—; *English:* Aaron's

Rod, Adams Flannel, Ag-leaf, Ag-paper, Beggar's Blanket, Beggar's Stalk, Blanket, Blanket-Leaf, Bullock's Lungwort, Candle-wick, Clot, Clown's Lungwort, Cow's Lungwort, Cuddie's Lungs, Cuddy's Lugs, Duffle, Feldwode, Feltwort, Flannel, Fluff-weed, Foxglove, Golden Grain, Golden Rod, Great Mullein, Hag-taper, Hare's Beard, Hedge Taper, High Taper, Hig Taper, Jacob's Staff, Jupiter's Staff, Ladies' Foxglove, Mullein Dock, Old Man's Flannel, Our Lady's Flannel, Our Lord's Flannel, Peter's Staff, Rag Paper, Sea Cabbage, Shepherd's Club, Shepherd's Staff, Taper, Torches, Velvet Dock, Virgin Mary's Candle, Woollen—; *French:* Blanc de Mai, Bonhomme, Bouillon ailé, Bouillon blanc, Bouillon mâle, Cage de Notre-Dame, Cierge de Notre-Dame, Coupeau blanc, Fleur du grand chandelier, Herbe à bonhomme, Herbe de saint Fiacre, Molène, Molène officinale—; *German:* Beinkœllenblume, Bergenkrautblume, Bolzenblume, Dotterblume, Fackelblume, Federblume, Feldkerze, Feuerblume, Frauenkerze, Gælhgœlliken, Gelepilblume, Gœlliken, Gundelblume, Himmelblume, Himmelkerze, Himmelkraut, Iohanneskerze, Kaiserkerze, Kerzenblume, Kerzenkraut, Kindskerze, Kœnigskerze, Kunkelblume, Lœwenfackel, Marienkerze, Molaine, Osterkerze, Rattenkraut, Schafschwanz, Schmerblume, Undoldkerze, Welkblume, Wellblume, Wetterkerze, Wilkeblume, Winterblume, Wolfkraut, Wollbluete, Wollblume, Wollstangen, Wollzottenblume, Wuellichblume, Wulskoppen, Wullenblume, Wunderblume, Zœllichblume, Zoppenblume—; *Greek:* Phlomos, Phlonos—; *Hindi:* Gidartamaku—; *Italian:* Barabasco, Tasso barabasso—; *Languedoc:* Ciergi de Nostro Damo—; *La Reunion:* Bouillon blanc—; *Malta:* Great Mullein, Tasso barbasso, Xarbet l'andar—; *Persian:* Busir, Mahizahreh—; *Polish:* Dziewanna—; *Portuguese:* Barbasco, Verbasco—; *Punjab:* Bantamaku, Bhunkedum, Eklbir, Gidartamaku, Gurganna, Kadanda, Karathri, Khargosh, Kharkharnar, Kwispre, Phasruk, Phul, Phuntar, Rawandchini, Spinkharnar, Vulr—; *Spanish:* Gordolobo—; *Urdu:* Janglitamak—.

CELSIA Linn.

Annual or biennial erect herbs. Leaves alternate, crenate, sinuate-dentate or inciso-pinnatifid. Flowers in terminal simple or

rarely branched spikes or racemes. Calyx deeply 5-fid or 5-partite; segments imbricate. Corolla rotate; tube scarcely any; lobes 5, broad, somewhat unequal, the upper outermost in bud. Stamens 4, didynamous or subequal; filaments bearded; anthers at the apex of the filament transverse or oblique, the cells confluent; staminodes 0. Ovary 2-celled; ovules many; style entire; stigma compressed, terminal. Capsule globose or ovoid, septicidally 2-valved, the valves each usually 2-fid. Seeds small, warted, not winged.—Species 40. —Mediterranean, Africa, Asia.

The genus is therapeutically inert.

1. **Celsia coromandeliana** Vahl Symb. Bot. III (1794) 79; Wight Ic. t. 1406.—Plate 691.

An annual herb; stem 0.6-0.9 m. high, hairy, often branched near the top. Leaves : Radical 5-10 by 2-3.8 cm., on long petioles, lyrate, compound or pinnatisect, with several small leaflets or segments at the base and a large ovate-oblong subacute terminal lobe; lower cauline leaves similar but smaller, and with shorter petioles; upper cauline leaves gradually becoming smaller and sessile, passing into bracts, all coarsely dentate, more or less hairy on both sides. Flowers yellow, in simple or branched terminal racemes 30-60 cm. long; rhachis glandular-pubescent; pedicels longer than the calyx, glandular-pubescent; bracts (or floral leaves) foliaceous, ovate, acute, sessile, gradually becoming smaller upwards. Calyx rather less than 6 mm. long, deeply divided, glandular-pubescent; lobes 4 mm. long, linear-oblong, subacute. Corolla rotate, 13 mm. diam.; lobes 5, rounded. Filaments densely bearded with purple hairs. Ovary globose, glabrous; style glabrous. Capsules 6-8 mm. diam., subglobose. Seeds 0.5 mm. long, oblong, truncate, warted.

Distribution: Throughout India and Ceylon.—Afghanistan, Ava, China.

The plant is useful in "vata" complaints and blood derangements (Ayurveda).

The inspissated juice of the leaves has been prescribed in several cases of acute and chronic dysentery with manifest advantage. Its action appears to be that of a sedative and astringent.

The juice of the whole plant squeezed out by pounding it, is used in half *chittak* doses, morning and evening, in cases of syphilitic eruptions. The juice of the leaves, mixed with mustard oil, in equal proportions, is applied as an external application for relieving the burning sensations of the hands and feet; mixed with sugar and water, it is used as a drink in bleeding piles.

Bengal: Koksima, Kukshima—; *Bombay:* Kolhal—; *Gujerati:* Kalhara, Kulahala, Kulahara, Kulara—; *Hindi:* Gadartambaku—; Kokshima—; *Marathi:* Kolhala, Kutki—; *Porebunder:* Kalara—; *Sanskrit:* Bhutakeshi, Kulahala, Sundika, Vishamushti—.

LINARIA Tourn. ex Mill.

Herbs. Leaves usually opposite or whorled below and alternate above. Flowers axillary, solitary, or the upper arranged in a terminal raceme or spike, the floral leaves reduced to bracts; pedicels slender; bracteoles 0. Calyx 5-partite; segments imbricate. Corolla personate, 2-lipped; tube spurred in front; upper lip erect, 2-lobed; lower lip spreading, 3-lobed; throat usually closed by the tumid palate. Stamens 4, didynamous, included, ascending; anthers with distinct parallel cells. Ovary 2-celled; ovules many; style filiform; stigma minute. Capsule ovoid or globose, 2-celled, both cells or the anterior only opening by an apical pore. Seeds angled, rugose or echinulate, wingless, or discoid and winged.—Species 100.—Chiefly in the temperate regions.

Purgative and diuretic; also emollient, resolvent, and vulnerary.

The following species are used medicinally in Europe—*L. arvensis* Desf., *L. cymbalaria* Mill., *L. elatine* Mill., *L. lanigera* Desf., *L. spartea* Hoff., *L. spuria* Mill., *L. supina* Desf., *L. triphylla* Mill., *L. vulgaris* Mill.—; in North America—*L. vulgaris* Mill.—.

1. **Linaria ramosissima** Wall. Pl. As. Rar. II (1831) 43; Wight Ill. t. 165.—PLATE 692.

A perennial herb often much-branched from the base; branches slender, terete, prostrate or suberect, 0.3-0.75 m. long, usually glabrous. Leaves alternate, very variable, 1.3-4.5 cm. long, variable in breadth, glabrous or the lower sometimes pubescent, the lower

5-7-lobed, triangular-hastate, the upper usually lanceolate-sagittate; petioles 6-13 mm. long, filiform. Flowers yellow, usually axillary, solitary; pedicels capillary, 1.3-3.8 cm. long, ebracteate. Calyx 5 mm. long, divided almost to the base, hairy, often becoming glabrous in fruit; segments linear-lanceolate, acute, from an ovate membranously margined base. Corolla (including the spur) nearly 13 mm. long, pubescent outside; spur 4 mm. long; upper lip 2-lobed, the lobes 1.5 mm. long, oblong, obtuse; the lower lip 3-lobed, the lobes spreading, 2 mm. long, oblong, obtuse. Stamens didynamous; filaments more or less pubescent. Ovary subglobose; style stout, 2 mm. long, glabrous or nearly so. Capsules ovoid or subglobose, 3 mm. diam. Seeds small, echinulate.

Distribution: Throughout India, usually in rocky and stony places, Ceylon, Upper Burma.—Afghanistan, Ava.

This plant is highly valued as a remedy for diabetes (Murray).

Gujarat: Bhintgalodi, Kanodi.

SCHWEINFURTHIA A. Br.

Annual or perennial branched usually glabrous herbs. Leaves usually alternate, quite entire. Flowers small, axillary. Calyx 5-partite; segments imbricate, the upper the largest. Corolla-tube large, subsaccate at the base, not spurred; limb 2-lipped, the upper lip erect, 2-lobed, the lower 3-lobed, the midlobe narrower than the lateral; palate closing the throat. Stamens 4, fertile, didynamous (the 5th rudimentary); anthers 2-celled, the cells divaricate after flowering. Style filiform; stigma minute. Capsule subglobose, fragile, 2-celled, the upper cell small, 3-4-seeded or empty, the lower longer and broader, large, many-seeded, bursting irregularly. Seeds obconic, ribbed or winged, truncate at both ends.—Species 3.—E. Africa to W. India.

The genus is therapeutically inert.

1. **Schweinfurthia sphærocarpa** A. Br. in Monatsb. Akad. Wiss. Berl. (1866) 875.—*Antirrhinum glaucum* Stocks ex Wight Ic. t. 1459.—PLATE 693.

A subglabrous glaucous herb 15-30 cm. high, from a perennial root; stems ascending, glabrous or puberulous. Leaves ill-smelling

when bruised, somewhat succulent, variable, 1.3-2.5 by 0.6-2 cm., elliptic or ovate, sometimes slightly obovate or so much attenuated at the base as to be subspathulate, acute, often apiculate, entire, sparsely clothed on both sides with very minute hairs or glabrous, base usually attenuated into a short petiole. Flowers axillary; pedicels equalling the petiole, deflexed in fruit. Calyx 5-partite, the upper segment very large, reaching 1.6 by 1.3 cm. in fruit, broadly ovate, subcordate, acute, veined, the remaining segments in fruit 8 by 3 mm., lanceolate, acute. Corolla scarcely 1.3 cm. long, dingy white with purple veins; upper lip 2-lobed; lobes oblong, obtuse, 1.25 mm. long; lower lip 3-lobed, spreading, the lobes oblong, obtuse. Capsules 6-8 mm. diam., obliquely globose, 2 celled, the lower cell many-seeded, the upper very small, 3-4-seeded. Seeds obconic, 1.25 mm. long, truncate at both ends, acutely winged, pale.

Distribution: Sind, Baluchistan, Rajputana Desert.—Afghanistan.

The drug is useful in the simultaneous derangement of " vata ", " pitta ", and " kapha "; tonic, diuretic, antipyretic; useful in typhoid conditions (Ayurveda).

The drug, which consists of the fruit and the powdered leaves together with portions of the stem, is prescribed to patients suffering from typhoid symptoms. The powder is snuffed up for bleeding at the nose (Stocks).

Hindi: Nepalnimb, Sanipat—; *Sind:* Sonpat—.

LINDENBERGIA Lehm.

Annual or prennial usually villous herbs, woody below; branches erect, straggling or ascending. Leaves opposite or the upper alternate, toothed. Flowers axillary or passing into terminal spikes or racemes, usually yellow; bracts leafy; bracteoles 0. Calyx campanulate, semi-5-fid. Corolla-tube cylindric; upper lip innermost in bud, broad, emarginate, or 2-lobed; lower lip larger, 3-lobed, spreading, outermost in bud; throat and lip with a 2-plicate palate. Stamens didynamous, included; anthers with separate stalked cells, all fertile. Capsule oblong or ovoid, 2-grooved, loculicidal; valves

entire, separating from the placentiferous dissepiment. Seeds numerous, minute.—Species 12.—Tropical Asia and Africa.

The genus is not therapeutically defined.

1. **Lindenbergia urticæfolia** Link and Otto Ic. Pl. Rar Hort. Berol. (1828) 48.—*L. polyantha* Royle ex Benth. Scroph. Ind. (1835) 22.—PLATE 694.

Annual, 10-50 cm. high, brittle when dry, glandular-villous or glabrate; stem simple or branched. Leaves 2-5 by 1.3-3.2 cm., ovate, subacute, crenate-serrate, usually glandular-villous on both sides; petioles 6-25 mm. long. Flowers solitary or 2-nate in the axils of large leaves, sometimes running out into axillary or terminal leafy racemes; pedicels short. Calyx 6 mm. long, densely glandular-villous, divided about one-third the way down; lobes triangular-oblong, subobtuse, hairy on both sides. Corolla yellow, 1.3 cm. long, more or less hairy outside, 2-lipped; upper lip shortly 2-lobed; lower lip with 3 rounded veined lobes, the midlobe narrower than the lateral ones and projecting beyond them, 1.25-1.5 mm. long, quadrate-oblong, rounded at the apex, the throat hairy. Ovary ovoid, glabrous when very young, afterwards pubescent near the apex; style 8 mm. long, exceeding the stamens, simple, filiform. Capsules oblong, hairy in the upper part, 5 mm. long. Seeds minute, 0.5 mm. long, ellipsoid-oblong, smooth or nearly so.

Distribution: Throughout India, Baluchistan, Waziristan.—Afghanistan.

The juice is given in chronic bronchitis, and mixed with that of the coriander, is applied to skin eruptions. The plant has a faint aromatic odor, and a slightly bitter taste.

Bombay: Gazdar—; *Gujerati:* Bhintachati—; Pattharachati, *Marathi:* Dhol, Gajhdar—.

STEMODIA Linn.

Herbs sometimes woody below, glandular-pubescent, often aromatic. Leaves opposite or 3-4-nately whorled. Flowers axillary, solitary, passing into terminal leafy spikes or close racemes; bracts leafy; bracteoles 1 or 2. Calyx 5-partite; segments narrow, imbricate, all equal or the upper a little larger. Corolla 2-lipped; tube

cylindric; upper lip exterior, suberect, entire or notched, the lower lip spreading, 3-lobed, the throat not plicate. Stamens 4, didynamous, included; filaments filiform; anther-cells stalked, distinct, all fertile. Ovary 2-celled; ovules numerous in each cell; style dilated at the apex, not winged above; stigma usually 2-lobed. Capsules globose, ovoid or acuminate; valves, 2, bifid, dehiscing septicidally, or valves 4 dehiscing both septicidally and loculicidally. Seeds minute, numerous.—Species 30.—Tropics.

The genus is therapeutically inert.

1. **Stemodia viscosa** Roxb. Corom. Pl. II (1798) 33, t. 163; Wight Ic. t. 1408.—PLATE 695.

Erect, much-branched, 7.5-60 cm. high, aromatic; stem and branches angular, viscidly pubescent. Leaves variable, 1.3-4.5 by 0.3-1.3 cm., sessile, usually oblong, acute (rarely obovate), serrulate or subentire, glandular-pubescent or nearly glabrous, usually tapering, often cordate and amplexicaul at the base. Flowers axillary, solitary, or in terminal few-flowered racemes; pedicels filiform, 6-8 mm. long; bracteoles 2, a little below the calyx, linear-subulate, 2 mm. long. Calyx 4 mm. long, 5-partite; sepals narrowly lanceolate, acute, glandular-hairy and ciliate. Corolla 8 mm. long, violet, glabrous; upper lip broad, entire or emarginate; lower lip hairy in the throat, with 3 rounded or emarginate lobes of about equal length, the midlobe the broadest. Filaments glabrous; anther-cells shortly stalked, suborbicular. Ovary glabrous. Capsules 6 mm. long, ovoid-oblong, acuminate, glabrous, 4-valved, slightly longer than the sepals. Seeds oblong-ellipsoid, about 0.4 mm. long.

Distribution: Central and peninsular India.

The dried plant, which is slightly fragrant and mucilaginous, is used by the natives of Bengal in infusion as a demulcent (Irvine).

Bombay: Nukachuni—; *Telugu:* Bodasarum, Guntakaminamu—.

LIMNOPHILA R. Br.

Herbs often paludine or acquatic, glabrous or pubescent, aromatic. Leaves transparently dotted, opposite or whorled, toothed

or cut, or, where submerged, often multifid. Flowers sessile or pedicelled, axillary, solitary, or passing into terminal spikes or racemes; bracts usually leafy; bracteoles small or 0. Calyx 5-partite; segments subequal or the upper the largest. Corolla 2-lipped, tube cylindric; upper lip outermost, suberect, entire or 2-fid; lower lip spreading, 3-lobed, throat not plicate. Stamens 4, didynamous, included; anther-cells usually separate and stalked, rarely contiguous. Ovary 2-celled; ovules numerous in each cell; style slender deflexed at the top; stigma 2-lamellate. Capsule ovoid or oblong, opening both septicidally and loculicidally, the placentiferous dessepiment separating with the valves. Seeds numerous, small, angular, truncate. —Species 30.—Palæotropics.

A. Leaves pinnately nerved, no whorls of pinnatifid or multifid leaves
  1. Calyx not striate in fruit. Leaves opposite, petiolate. Fowers sessile .... 3. *L. roxburghii.*
  2. Calyx striate in fruit. Flowers pedicellate .... 1. *L. gratissima.*
B. Leaves with 3-5 parallel nerves. Fruiting-calyx not striate Stem 7.5-20 cm. Corolla 8 mm. long. Plant smelling strongly of turpentine .... 2. *L. gratioloides.*

The leaves are diuretic and tonic.

L. roxburghii G. Don. is used medicinally in the Philippine Islands.

1. **Limnophila gratissima** Blume Bijdr. (1826) 749.—Plate 696A.

Stem decumbent at the base, copiously rooting at the lower nodes, then erect, not much-branched, 30-50 cm. long, stout, terete, spongy, glabrous, striate. Leaves 2.5-5 by 0.6-2 cm., opposite, or more commonly in whorls of 3, sessile, ½-amplexicaul, lanceolate-oblong, acute, sharply serrate, glabrous; nerves few, inconspicuous. Flowers on long slender glandular pedicels, solitary and axillary, or in axillary and terminal racemes; bracteoles beneath the calyx 1.5 mm. long, linear-subulate; pedicels 1.3-2.5 cm. long. Calyx 6 mm. long, not divided quite to the base, glandular, becoming striate in fruit; segments lanceolate, acute, subequal, with spreading tips. Corolla 1.3 cm. long, purplish. Capsules rather less than 6 mm. long,

ovoid-oblong, covered by the striate calyx. Seeds about 0.4 mm. long, truncate at both ends.

Distribution: W. Peninsula, Ceylon.—Malay Islands, Philippines, China, Japan, N. Australia.

The juice of the plant is used medicinally as a cooling medicine in fever, and given to women who are nursing, when the milk is sour; a good antiseptic (Ayurveda).

Bengal: Karpur—; *Hindi:* Kuttra—; *Malayalam:* Manganari—; *Marathi:* Ambuli—; *Sanskrit:* Ambuja, Amragandhaka—.

2. **Limnophila gratioloides** R. Br. Prodr. (1810) 442. —PLTEA 696B.

A small plant 7.5-20 cm. high, smelling strongly of turpentine; stems subquadrangular, slender, rooting at the lower nodes, glabrous, striate, usually much-branched from the base. Leaves usually all whorled or pinnatifid, the upper sometimes entire and opposite, 6-20 by 1.5-3 mm., linear-oblong, serrate-dentate, 1-nerved, the lowest sometimes, though not commonly, capillaceo-multifid. Flowers solitary, axillary or racemose; bracteoles 2.5 mm. long, linear-subulate; pedicels 4-8 mm. long, filiform, divaricate.. Calyx membranous, thinly and finely glandular, not striate in fruit, 4-5 mm. long in flower, hemispheric in fruit, divided scarcely half way down; segments narrowly triangular, acute. Corolla pink, 8 mm. long. Capsules broadly ovoid or subglobose, 4 mm. long. Seeds 0.6 mm. long, truncate or obscurely rounded at the ends.

Distribution: Throughout India in wet places, Baluchistan, Ceylon.—Malay Archipelago, China, Australia, tropical Africa.

It is considered to be antiseptic and its juice is rubbed over the body in pestilent fevers (Ayurveda).

It is also given internally in dysentery, combined with ginger, cumin, and other aromatics.

A liniment made from the plant with cocoanut oil is used in elephantiasis.

Bengal: Karpur—; *Hindi:* Kuttra—; *Malayalam:* Manganari—; *Marathi:* Ambuli—; *Sanskrit:* Ambuja, Amragandhaka—; *Tagalog:* Inata—.

3. **Limnophila roxburghii** G. Don Gen. Syst. IV (1837) 543 (non Benth.).—*L. menthastrum* Benth. in DC. Prodr. X, 386.

An erect very aromatic herb 30-60 cm. high; stems many, stout, glabrous. Leaves all opposite; 2.5-7.5 by 1.6-3.8 cm., elliptic-lanceolate, acute or subobtuse, crenulate, glabrous or pubescent, often hairy on the nerves beneath, transparent-dotted, base acute; main nerves pinnate, arching from the midrib, numerous, strong and prominent beneath; petioles variable, sometimes reaching 2 cm. long, sometimes hardly any. Flowers sessile, in axillary shortly pedunculate heads, rarely solitary. Calyx not divided quite to the base, pubescent outside; tube 2.5 mm. long; upper segment 6 mm. long, linear-oblong, subobtuse, ciliate, broader than the other 4 which are 5 mm. long, narrowly lanceolate, very acute, ciliate. Corolla rather less than 1.3 cm. long, bluish purple with a yellow mouth, pubescent outside; lower lip with yellow hairs in the throat. Capsules 6 mm. long, oblong-ellipsoid, glabrous. Seeds scarcely 0.8 mm. long, angular, truncate.

Distribution: More or less throughout India.—China, Philippines, Pacific Islands.

In the Philippine Islands, an infusion of the leaves is used as a diuretic, tonic, and stomachic.

Ilocano: Taratara—; *Pampangan:* Talatala—; *Tagalog:* Tala, Taramhampam—.

Moniera B. Juss.

Glabrous herbs. Leaves often punctate, entire or toothed, or submerged and multifid. Flowers axillary, solitary or racemose; bracteoles small or 0. Calyx 5-partite; segments imbricate, the upper largest, the 2 lateral innermost, often very narrow. Corolla 2-lipped; tube cylindric; lips spreading, the upper outer in bud, notched or 2-lobed, the lower lip 3-lobed. Stamens didynamous, included; anthers sometimes approximate in pairs, the cells contiguous, parallel, distinct. Ovary 2-celled; ovules many in each cell; style dilated at the top; stigma entire or 2-lobed. Capsule globose or ovoid, 2-grooved; valves 2 or 4, separating from an entire column. Seeds many, minute.—Species about 50.—Warmer regions of both hemispheres.

M. cuneifolia Michx. is used medicinally in China.

1. **Moniera cuneifolia** Michx. Fl. Bor. Amer. II (1803) 22.—*Herpestis Monnieria* H. B. & K. Nov. Gen. & Sp. Pl. II (1817) 366.—PLATE 696C (under *Herpestis Monnieria*).

A glabrous somewhat succulent creeping herb; stems 10-30 cm. long, rooting at the nodes; branches numerous, ascending. Leaves sessile, decussate, 6-25 by 2.5-10 mm., obovate-oblong or spathulate, rather fleshy, dotted with black specks, very obtuse, quite entire; nerves obscure. Flowers axillary, solitary; bracteoles 5 mm. long, linear; pedicels 0.6-3.2 cm. long, slender. Calyx glabrous, divided to the base; upper sepal 6 by 3-4 mm., ovate, acute; the other 4 sepals slightly shorter than the upper; the 2 inner lateral ones 1.5 mm. wide, lanceolate, acute. Corolla pale blue or almost white, 8 mm. long; lobes nearly equal, rounded, spangled when fresh with shining dots. Anthers bluish purple; pollen white. Capsules 5 mm. long, ovoid, acute, pointed with the style-base, glabrous. Seeds about 0.85 mm. long, oblong, striate, pale.

Distribution: Throughout India in wet places, Ceylon.—All warm countries.

The plant is bitter, pungent; heating, emetic, laxative; useful in bad ulcers, tumours, ascites, enlargement of the spleen, indigestion, scorpion-sting, snake-bite, inflammation, leprosy, anæmia, " vata ", " kapha ", and biliousness (Ayurveda).

The plant is bitter; aphrodisiac; good in scabies, leucoderma, syphilis; purifies the blood; useful in diarrhœa and pyresis; maturant and expectorant (Yunani).

It is considered by the Hindu physicians a nervine tonic useful in insanity, epilepsy and hoarseness. It is also regarded as a powerful diuretic and aperient.

The juice of the leaves, conjoined with petroleum, is used as a local application in rheumatism.

A teaspoonful of the juice of the leaves given to infants suffering from catarrh or severe bronchitis gives relief by causing vomiting and purging.

In Pondicherry, the plant is considered an aphrodisiac; and in Ceylon, it is prescribed in fevers.

In Ceylon, the whole plant is used as a mild purgative for children; also as fomentation for erysipelas and elephantiasis. The expressed juice or an aqueous extract of the fresh stems and leaves is given internally for snake-bite (Roberts).

Brahmi-ghritha or a medicated ghee whose chief ingredient is *M. cuneifolia* was administered in cases of epilepsy and hysteria and in one case of chorea; cases of epilepsy were considerably benefited by its use, the attacks coming on at longer intervals. Hysteria cases were completely cured. The case of chorea did not derive any benefit from it (Koman).

The leaves contain an alkaloid which produces toxic symptoms similar to those of strychnine. The alkaloid raises the blood-pressure through vaso constriction and stimulation of the cardiac muscles, and it always produces stimulation of the respiration (K. C. Bose and N. K. Bose; *Journ. Ind. Med. Ass.*, October 1931).

The stem and leaves are useless in the antidotal treatment of snake-bite (Mhaskar and Caius).

Bengal: Adhabirni, Brihmisak, Dhopchamni—; *Bombay:* Bama—; *Chinese:* Pa Chi T'ien—; *Hindi:* Barambhi, Brahmi, Jalneem, Safedchamni, Svetchamni—; *Malay:* Bremi—; *Malayalam:* Brami, Nirubrahmi—; *Orissa:* Krishnaparni—; *Sanskrit:* Bharati, Brahmi, Brmhacharini, Brmhakanyaka, Divya, Divyateja, Kapotavanka, Kapotavega, Mahaushadhi, Mandukamata, Manduki, Matsyakshi, Medhya, Parameshthini, Saraswati, Saumyalata, Sharada, Soma, Somavalli, Somya, Surasa, Surashreshtha, Sureshta, Survarchala, Swayambhuvi, Vaidhatri, Vallari, Vara, Vira, Vayastha—; *Sinhalese:* Lunuvila—; *Tamil:* Brami, Nirbrami, Nirpirimi—; *Telugu:* Sambranichettu—; *Urdu:* Jalanim, Nirabrahmi—.

ARTANEMA Don.

Erect herbs, the angles of the stem and upper surface of the leaves scabrid, otherwise glabrous. Leaves opposite, entire or serrate. Flowers large, blue or purple, racemose at the ends of the branches; pedicels solitary in the axils of foliaceous bracts; bracteoles 0. Calyx 5-partite; segments herbaceous, acuminate, with a broad

base, much imbricate. Corolla 2-lipped; tube elongate, broad: upper lip erect, broad, emarginate; lower lip spreading, 3-fid. Stamens 4, perfect, didynamous; the 2 upper with short filaments included in the tube; the 2 lower with long arcuate filaments broadly appendiculate at the base, inserted on the throat, conniving at the apex under the upper lip; anthers approximate in pairs or cohering, the cells confluent at the tip. Ovary 2-celled; ovules many in each cell; stigma 2-lamellate. Capsule globose, septicidally dehiscent; valves entire, separating from the placentiferous axis. Seeds numerous, small, rugose.—Species 4.—Indo-Malaya, Africa.

The genus is not therapeutically defined.

1. **Artanema sesamoides** Benth. Scroph. Ind. (1835) 39; Wight Ic. t. 1410.

A stout herb, 60-90 cm. high, sparingly branched; stem acutely quadrangular, glabrous, often tinged with purple. Leaves sessile or shortly petiolate, 3.8-15 by 1-4.5 cm., lanceolate, acute or acuminate, entire or serrate, more or less scabrid. Flowers large, in erect lax terminal racemes; pedicels 6-16 mm. long; bracts beneath the pedicels 6-8 mm. long, lanceolate, acute. Calyx 8-11 mm. long, divided to the base or nearly so; sepals ovate, acute, nearly glabrous, much imbricate. Corolla dull violet-purple, 19-22 mm. long, reticulately veined; tube broad. Filaments of the lower stamens long, arching, dilated and furnished with a discoid appendage at the base. Capsules globose, 6-10 mm. diam., glabrous. Seeds 0.6 mm. long, oblong, rounded or truncate at the ends, covered with white tubercles, yellowish.

Distribution: W. Peninsula, Ceylon, Malay Peninsula.—Sumatra, Java, Philippines, Borneo, tropical Africa.

A decoction of the root is given in rheumatism, gravel, syphilis, ophthalmia, and diarrhœa.

The seeds are said to cure biliousness, to improve vitality, and to favour conception.

Sanskrit: Kokilaksha—; *Sinhalese:* Gaskotala—.

CURANGA Juss.

Diffuse or creeping herbs. Leaves opposite, ovate, crenate. Flowers in short terminal or pseudo-axillary racemes; pedicels opposite, bracteate, ebracteolate. Sepals 4, spreading, upper and lower very large, much enlarged in fruit, lateral small, narrow. Corolla-tube short, upper lip broad, arched, notched; lower longer, spreading, 3-fid. Stamens 2 upper perfect, included; anthers cohering, cells divaricate; staminodes 2, clavate. Stigma 2-lamellate. Capsule orbicular, included in the much enlarged calyx, septicidal, valves separating from the broad placentiferous axis. Seeds numerous, rugose.—Species 1.—Indo-Malayan.

1. **Curanga amara** Juss. in Ann. Mus. IX, 320.—PLATE 697A.

Annual, glabrous. Branches slender, straggling, divaricate, rooting at the lower nodes, 0.6-0.9 m. long. Leaves 5-6.3 cm., obtuse or acute; petiole 1.3 cm., slender. Racemes short, few-flowered; pedicels 6-8 mm. Calyx in flower 6 mm., in fruit 13 mm.; outer sepals broadly ovate-cordate, membranous, reticulate. Corolla red-brown. Capsule 4 mm. diam., compressed. Foliage very bitter.

Distribution: Sikkim Himalaya, Assam, Mishmi, Cachar, Chittagong, Tenasserim, Malay Peninsula.—Borneo, Philippine Islands, Amboyna.

The plant is used as a febrifuge.

It has been examined chemically (*Journ. Chem. Soc.;* 1900, 1903).

TORRNIA Linn.

Glabrous or pubescent herbs. Leaves opposite, entire, crenate or serrate. Flowers often showy, axillary or in terminal or pseudo-axillary umbels or racemes; bracteoles 0. Calyx tubular, 3-5-winged, or plaited, or keeled, 2-lipped or 3-5-toothed. Corolla 2-lipped; tube cylindric, somewhat curved, dilated upwards; upper lip erect, concave or pinched, notched or 2-fid; lower larger, spreading, 3-lobed. Stamens 4, didynamous; the 2 upper included in and adnate to the tube; the 2 lower adnate to the throat, often appendaged at

the base, conniving under the upper lip; anthers touching or cohering in pairs, the cells often confluent. Ovary 2-celled; ovules many in each cell; style slender; stigma 2-lamellate. Capsule linear or oblong, not exceeding the calyx; valves separating from the placentiferous dissepiment. Seeds rugose or cancellate.—Species 22.—Tropics.

The genus is therapeutically inert.

1. **Torenia asiatica** Linn. Sp. Pl. (1753) 619.—Plate 697B.

Stems creeping, rooting at nodes, glabrous, with many long straggling spreading or erect branches. Leaves 2-3.2 cm., ovate-lanceolate, rounded at base but tapering on the petiole, acute, serrate, slightly rough with short hair on both sides, petiole 6-13 cm. Flowers solitary, pedicels erect or spreading, glabrous, 3.8-5 cm., long, becoming thickened and deflexed in fruit. Calyx near 2 cm., cut about half way down into 2 acute lips, glabrous, tube 5-ribbed, slightly winged. Corolla-tube 2.5 cm., limb nearly 2.5 cm. diam., upper lip arched, nearly entire, lobes of lower lip broader than long; capsule about as long as calyx. Seeds excavated.

Distribution: S. India, Ceylon, Burma.—Java, China.

The juice of the leaves is considered on the Malabar Coast a cure for gonorrhœa.

Malayalam: Kakupu—; *Mundari:* Huringsikriba—; *Sinhalese:* Kotalawel—.

Vandellia Linn.

Herbs usually annual, glabrous or pubescent. Leaves opposite, often toothed, penninerved. Flowers small, usually axillary; bracteoles 0. Calyx campanulate; segments 5, free or connate, not winged. Corolla 2-lipped; tube cylindric; upper lip outermost, erect, concave, notched or 2-fid; lower lip broader, spreading, 3-lobed. Stamens 4, didynamous, the 2 upper inserted on the corolla-tube, usually included, the 2 lower inserted on the corolla-throat with arched filaments which are furnished with a dentiform or subulate appendage at or towards the base; anthers touching or cohering in

pairs under the upper lip, the cells divaricate. Ovary 2-celled; ovules many in each cell; style slender; stigma 2-lamellate. Capsule globose or ovoid, or long-cylindric, septicidally 2-valved; valves separating from the placentiferous dissepiment; placentæ large. Seeds many, rugose.—Species about 30.—Tropics and subtropics.

1. Capsule about equalling the calyx in length or shorter ...... 1. *V. pyxidaria.*
2. Capsule much longer than the calyx .... 2. *V. pedunculata.*

Antibilious, emetic, and febrifuge; used in malignant fevers and dysentery.

V. diffusa Linn. is used medicinally in Guiana, Brazil, and Paraguay.

1. **Vandellia pyxidaria** Maxim. Diagn. Pl. Nov. Dec. XIX, 419.—*V. erecta* Benth. Scroph. Ind. 36.— PLATE 698A (under *V. erecta*).

A small erect glabrous annual, 10-20 cm. high, branching from the base, branches not rooting. Leaves sessile, 1.3-2 cm. long, elliptic or oblong, obtuse, entire or obscurely crenate; nerves 7.5-12.5 cm. long, parallel. Pedicels axillary, solitary, slender, usually twice as long as the leaves. Calyx-segments 3-4 mm. long, free to the base, lanceolate or linear, rather obtuse, shorter than the ovoid-orbicular capsule.

Distribution: Himalaya from Kashmir to Assam, common in Bengal, also in Central and S. India.—Siam, China, Japan, Malaya, Polynesia, westwards to France.

Used in a ghrita as a remedy for gonorrhœa, and the juice is given to children who pass green-coloured stools.

Marathi: Vakapushpi–-.

2. **Vandellia pedunculata** Benth. Scorph. Ind. (1835) 37.—PLATE 698B.

A small glabrous diffusely branched herb; stem sometimes creeping at the base and rooting at the nodes, 10-25 cm. long, striate, often tinged with purple. Leaves shortly petiolate or sometimes almost sessile, 1.3-2 by 0.8-1.3 cm., ovate, subacute, crenate-serrate, glabrous, base subcordate. Flowers solitary, axillary; pedicels 2-3.2 cm. long. Calyx 5 mm. long, divided to the base; sepals lanceolate, very acute.

Corolla 1 cm. long, usually white with a pale violet margin, the lower lip marked with a yellow spot. Capsules twice as long as the calyx, linear-lanceolate, acute, tipped by the persistent style-base. Seeds scarcely 0.8 mm. long, ellipsoid.

Distribution: More or less throughout India, in damp places, Ceylon.—Borneo, China, Cochin-China.

It is used for the same purpose as *V. pyxidaria.*
Marathi: Gadagvel—.

BONNAYA Link and Otto.

Annual glabrous herbs. Leaves opposite, entire or serrate, obscurely penninerved. Flowers solitary, axillary, or often passing into terminal racemes; bracteoles 0. Calyx 5-partite; segments narrow, hardly imbricate. Corolla 2-lipped; tube cylindric; upper lip erect, broad, concave or 2-fid; lower lip larger, 3-lobed, spreading. Stamens : the 2 upper only perfect, subincluded, with filiform filaments; the 2 lower reduced to 2 obtuse glandular staminodes; anthers of the perfect stamens connivent, the cells divaricate. Ovary 2-celled; ovules many in each cell; style slender; stigma 2-lamellate. Capsule narrow, much exserted, septicidal; valves entire, separating from the placentiferous dissepiment. Seeds many, rugose.—Species 5.—Warm regions.

B. reptans Spreng. is used medicinally in China and Malaya.

1. **Bonnaya reptans** Spreng. Syst. Veg. I (1825) 41.—*B. veronicæfolia* Wight Ic. t. 1411 (not Spreng).—*Ilysanthes reptans* Urban.

Prostrate, creeping and rooting at the nodes; branches often 30 cm. long. Leaves distant, 2-3.8 by 1.3-2 cm., elliptic-oblong or obovate-oblong, rounded at the apex, sharply closely and deeply serrate, base narrowed into a petiole of variable length. Flowers in axillary and terminal racemes; pedicels 6-13 mm. long, spreading; bracts beneath the pedicels 6 mm. long, linear-subulate. Calyx 8 mm. long, deeply divided; segments 6 mm. long, linear-lanceolate,

acute. Corolla exceeding 13 mm. long, light purple. Capsules 1.3-2.5 cm. long, very slender. Seeds about 0.6 mm. long, yellow.

Distribution: India, Java, Philippines.

In Lakhimpur, the herb is applied externally for worms in the skin (Carter).

Chinese: Han Hsin, Ting Ching—; *Lakhimpur:* Kausidarya—; *Malaya:* Han sin, Thin Keng—.

Scoparia Linn.

Branched glabrous or pubescent herbs or undershrubs. Leaves opposite or whorled, entire or toothed, punctate. Flowers small, white, yellow or bluish, solitary or 2-nate, axillary, ebracteolate. Sepals 4-5, imbricate in bud. Corolla rotate, 4-fid, throat densely bearded; lobes obtuse, subequal. Stamens 4, subequal, filaments filiform; anthers subsagittate, cells distinct, parallel or diverging. Style subclavate, stigma notched or truncate; ovules many. Capsule globose or ovoid, septicidal; valves entire, membranous, margins inflexed separating from the placentiferous axis. Seeds many, obovoid, angled, scrobiculate.—Species 10.—Tropical America.

S. dulcis Linn. is used medicinally in Guiana, Madagascar, the Gold Coast, and Guinea.

1. **Scoparia dulcis** Linn. Sp. Pl. (1753) 116.

An erect much-branched fœtid herb with 3-nately whorled, glandular, serrate leaves 1.3-3.8 cm., rhomboid or elliptic with tapering base, serrate. Flowers 3-6 from each whorl on slender 8-13 mm. long pedicels. Corolla delicate white, 5 mm. diam. Capsule very small, 2.5 mm., subglobose, valves ultimately 2-fid.

Distribution: A native of America. Widely spread in India.

In India, it is used in infusion in ague.

In Guiana, every part of the plant is used as an emetic. As a gargle the plant is used as a cure for tooth-ache. A decoction of the root is given in blennorrhagia and in excessive menstruation. The root is considered astringent, mucilaginous, and emollient. An infusion of the bitter leaves is prescribed in febrile conditions.

The Antnanaka of Madagascar use an infusion of the leaves in stomach troubles. In Guinea, it is considered diuretic and is a popular remedy for children.

On the Gold Coast, the twigs are pounded and mixed with Guinea Grain (Williams) or *hire* (a white clay) and with water, the liquor being drunk to cure sore throat.

Antsianaka: Famafantsambo—; *Ashanti:* Onyame Kong me tiri—; *Betsimisaraka:* Tsinjiajia—; *English:* Sweet Broom Weed—; *French Guiana:* Balai doux, Herbe à balai, Herbe à balai sauvage, Petit balai à graines—; *Madagascar:* Jamalamprika—; *Malay:* Bunga baik salam, Cha padang, Dulis, Te' Macao—; *Mundari:* Cinibuta, Cinisakam, Guruara, Koara, Madukamara, Merommedara, Pirimadukam, Otekantara—; *Pampangan:* Malaanis—; *Tagalog:* Chachachachachan, Saangcabaya—.

PICRORRHIZA Royle ex Benth.

A low more or less hairy herb, with perennial woody bitter stock. Leaves subradical, spathulate, serrate. Flowers spicate on radical leafy flowering stems, bracteate, ebracteolate, white or bluish, dimorphic (a longer and shorter stamened form). Sepals 5, lanceolate, imbricate in bud. Corolla of the long stamened form short, membranous, subequally 5-cleft to the middle; lobes ovate, acuminate, ciliate; of the shorter stamened, corolla-tube curved, broad; limb 2-lipped, upper lip longer subgaleate emarginate, lower of 3 shorter ovate acute lobes, the middle one smallest. Stamens 4, filaments in the longer stamened very slender, four times as long as the corolla; of the shorter stamened stout, 2 upper shorter than the upper lip of the corolla, with the anthers under the hood, 2 lower exserted; anther-cells subdivergent confluent at the tip. Ovary 2-celled, many-ovuled; style of the long stamened long and slender, stigma simple; of the shorter stamened stouter and shorter, stigma capitate exserted. Capsule ovoid, turgid, acute, septicidal and loculicidal, margins of the valves inflexed, exposing the columnar placentiferous axis. Seeds of an oblong curved nucleus, enclosed in the large bladdery loose hyaline reticulated testa.—Species 1.—Himalaya.

P. kurrooa Benth. is used medicinally in China and Malaya.

1. **Picrorrhiza kurrooa** Benth. Scorph. Ind. 47; Royle Ill. 291, t. 71.—PLATE 699.

Rootstocks as thick as the little finger, 15-25 cm. long, clothed with withered leaf-bases. Leaves 5-10 cm., rather coriaceous, tip rounded, base narrowed into a winged sheathing petiole. Flowering stems or scapes ascending, stout, longer than the leaves, naked or with a few bracts below the inflorescence. Spikes 5-10 cm. long, subcylindric, obtuse, many-flowered, subhirsute; bracts oblong or lanceolate, as long as the calyx. Sepals 6 mm. long, ciliate. Corolla of short stamened form 6-8 mm. long, with longer filaments 8 mm. long, of the longer stamened from 6 mm., with filaments 2 cm. long. Capsule 1.3 cm. long.

Distribution: Alpine Himalaya, from Kashmir to Sikkim, 9,000—15,000 ft.

The root is bitter; cooling, stomachic, cardiotonic, antipyretic, anthelmintic, laxative; promotes appetite; useful in "kapha", biliousness, bilious fevers, urinary discharges, asthma, hiccough, blood troubles, burning sensations, leucoderma, jaundice; purifies the nurses' milk (Ayurveda).

1. *White variety:*—The root has a very bitter, sharp taste; pectoral, laxative, brain tonic, emetic; good in paralysis, most fevers, liver complaints, menstrual disorders, epilepsy, pain in the joints, biliousness; applied in ringworm, scabies, bites from rats and dogs.—2. *Black variety:*—The root is less bitter; purgative, expectorant, antipyretic, emmenagogue; removes bad humours, piles, inflammation; useful in hemicrania, nose troubles, chest complaints, leucoderma; good for the gums and the teeth (Yunani).

The root is bitter, acrid and stomachic, and in large doses moderately cathartic. It is used in fever and dyspepsia in many purgative preparations. About two drachms of the powdered root, with sugar and warm water, act as a gentle aperient.

In China and Malaya, the rhizome is a favourite remedy for bilious dyspepsia accompanied by fever.

I can say that it is a good stomachic and very useful in almost all forms of dyspepsia and in nervous pain of the stomach and bowels. Doses, as an antiperiodic, from 20 to 40 grains, and as a stomachic and tonic, from 10 to 15 grains, three or four times a day (Moodeen Sheriff).

It was administered as an antiperiodic to a large number of cases, but the action was found to be slow. There is no doubt it possesses antiperiodic properties in a mild degree (Koman).

The root is prescribed in snake-bite (Charaka, Sushruta, Vagbhata, Roberts) and scorpion-sting (Sushruta); but it is not an antidote to either snake-venom (Mhaskar and Caius) or scorpion-venom (Caius and Mhaskar).

Arabic: Kharbagehindi, Kharbikulbayaz, Kharbikulsuda—; *Bengal:* Katki, Kuru, Kutki—; *Bombay:* Balkadu, Kalikutki—; *Cantonese:* Oo wong lin—; *Chinese:* Hu Huang Lien—; *Deccan:* Kalikutki—; *Gujarat:* Kadu—; *Hindi:* Katki, Kuru, Kutki—; *Kumaon:* Kuruwa—; *Malaya:* Oo wong lin—; *Malayalam:* Katukhurohani—; *Marathi:* Kutaki—; *Nepal:* Kutki—; *Persian:* Kharbaqehindi—; *Punjab:* Kalikutki, Karru, Kaur—; *Sanskrit:* Anjani, Arishta, Ashoka, Asokarahini, Chakrangi, Chitrangi, Dhanvantarigrantha, Dvijangi, Janani, Kanderuha, Katamvara, Katavi, Katuka, Katumbhara, Katurohini, Kedarakatuka, Krishna, Krishnabheda, Mahaushadhi, Malabhedini, Matsyapitta, Matsyashakala, Nakulasadani, Shakuladani, Shataparva, Tikta, Tiktarohanika, Vamaghni, Vantida—; *Tamil:* Katukurogani—; *Telugu:* Katukarogani, Katukkurohini, Katukuroni—; *Urdu:* Kutakisafed, Kutakisiyah—.

VERONICA (Tourn.) Linn.

Herbs or shrubs, rarely trees. Leaves opposite, the cauline or all rarely alternate. Flowers solitary, axillary, or in terminal or axillary racemes; bracts usually conspicuous; bracteoles 0. Calyx 4-5-partite; lower segments connate; the uppermost, if present, smaller. Corolla rotate or shortly hypocrateriform; lobes spreading, the lateral or one of them outermost in bud, the upper and lower

lobes usually narrowest. Stamens 2, adnate to the corolla-tube by the sides of the upper lobe, exserted; anther-cells parallel or not, obtuse, their tips confluent. Ovary 2-celled; ovules in each cell many or few, rarely only 2; style simple; stigma subcapitate. Capsule 2-grooved, compressed or turgid; dehiscence various. Seeds many or few, ovoid or globose, plano-concave or boat-shaped, rugulose or smooth, sometimes winged.—Species 250.—Extra-tropical, many alpine.

1. An erect herb .... 1. *V. anagallis.*
2. A decumbent herb .... 2. *V. beccabunga.*

Diuretic and antiscorbutic.

The following species are used medicinally in Europe and North America—*V. anagallis* Linn., *V. beccabunga* Linn., *V. officinalis* Linn.—; in China—*V. anagallis* Linn.—; in Guiana— *V. americana* Schwein.—.

OFFICINAL :—*V. beccabunga* Linn.=*V. limosa* Lejeune (Portugal), and *V. officinalis* Linn. (Denmark, Portugal); the plant.

The flowered stem of *V. officinalis* Linn. in France.

1. **Veronica anagallis** Linn. Sp. Pl. (1753) 12.—PLATE 700A.

An erect succulent usually glabrous herb 7.5-45 cm. high. Leaves sessile and half-amplexicaul or the lowest petiolate, 3.2-12.5 by 0.6-2 cm., oblong or oblong-lanceolate, obtuse or subacute, entire or more or less serrate, glabrous, base usually cordate. Flowers in axillary lax slender racemes 7.5-15 cm. long; bracts beneath the pedicels linear-lanceolate, acute, 2.5-4 mm. long; pedicels 3-6 mm. long, filiform. Calyx 1.5-3 mm. long, divided to the base; sepals ovate, subacute. Corolla 4-6 mm. across, pink or white; tube very short. Capsules compressed, orbicular-oblong, 3-4 mm. long, emarginate, glabrous. Seeds ellipsoid-oblong, 0.6 mm. long, biconvex.

Distribution: Kashmir, Punjab, Bhutan, Bengal, Assam, W. Peninsula.—Europe, N. Asia, S. Africa, N. America.

Its therapeutic uses are the same as those of *V. beccabunga.*

Catalan: Herba de locos—; *Chinese:* Shui K'u Mai—; *English:* Water Speedwell—; *French:* Mouron d'eau, Petit beccabongue, Petit

beccabunga, Véronique mourn—; *Malta:* Water Speedwell, Erba grassa—; *Spanish:* Anagallide acuatica—.

2. **Veronica beccabunga** Linn. Sp. Pl. (1753) 12.—PLATE 700B.

A glabrous or puberulous, decumbent, succulent herb. Stem hollow, branches 15-45 cm., spreading. Leaves 2.5-5 cm., sessile or shortly petioled, elliptic or oblong-obtuse, rarely obovate, crenate-serrate, base rounded. Racemes axillary, few- or many- flowered, 5-10 cm.; pedicels spreading, bracts usually shorter than the pedicels. Sepals ovate-oblong, subacute. Corolla 8 mm. diam., blue or pink. Capsule and seeds as in Veronica anagallis.

Distribution: W. Himalaya, Waziristan.—Afghanistan to Europe, N. Asia to Japan, Abyssinia.

The plant is used medicinally in Kashmir (Honigberger).

The herb is alterative and diuretic. It is given in scurvy, impurity of blood, etc.

A full dose of the juice of the fresh plant is an easy purge; and Brooklime has always been a popular remedy for scrofulous affections, especially of the skin. The bruised plant has been applied externally for healing ulcers, burns, whitlows, and for the mitigation of swollen piles.

Dutch: Beekeboom—; *English:* Becky-leaves, Broklembe, Brooklime, Cow-cress, Horse-cress, Horse-well Grass, Limewort, Limpwort, Wall-ink, Water Pimpernel, Water Purpy, Well-ink—; *French:* Beccabonga, Beccabongue, Beccabunga, Beccabungin, Cocapumba, Cresson de cheval, Cresson de chien, Cressonnée, Cressonnière, Grand beccabonga, Grand beccabunga, Laitue de chouette, Salade de chouette, Véronique aquatique, Véronique cressonnée, Véronique cressonnière—; *German:* Bachbunge, Bungenkraut, Lienken, Lœmek, Luenich, Pabunge, Pfundenkraut, Quellenehrenpreis, Verborgenwiederkunft, Viehkraut, Wasserbohne, Wasserbunge, Wassergauchhirse, Wasserheil, Wohlgemut—; *Greek:* Anagallis enhydra—; *Italian:* Anagallide aquatica, Beccabunga—; *Languedoc:* Creissoun bouionc—; *Malta:* Brooklime—; *Portuguese:* Beccabunga, Morriao de agua—; *Spanish:* Becabunga—.

Striga Lour.

Herbs usually scabrid, discoloured or black when dry. Leaves : The lower opposite, the upper alternate, linear, entire, rarely toothed, sometimes reduced to scales. Flowers axillary, or the upper in bracteate spikes; bracteoles usually 2. Calyx tubular, 4- or 5- or 10- or 15- ribbed, 5- (rarely 4-) toothed or fid. Corolla 2-lipped; tube slender, abruptly incurved at or above the middle; limb spreading, lthe upper ip inner in bud, usually short, notched or 2-fid, the lower lip 3-lobed. Stamens 4, didynamous, included; anthers 1-celled, vertical, dorsifixed, bases obtuse, the connective sometimes mucronate. Capsule subglobose or oblong, loculicidal; valves entire, septiferous, separating from the placentæ. Seeds numerous, ovoid or oblong, usually reticulated.—Species 22.—Palæotropics and S. Africa.

1. Calyx 10-15-ribbed .... 1. *S. lutea.*
2. Calyx 5-ribbed .... 2. *S. orobanchoides.*

The genus is therapeutically inert.

1. **Striga lutea** Lour. Fl. Cochinch. (1790) 22.

Stems 7.5-30 cm. high, erect, rigid, slender, or branched, strigose with prickly hairs. Leaves sessile, 1.3-3.2 cm. long, linear, often rough with pustular prickles. Flowers in long, lax spikes; bracts usually longer than the calyx; bracteoles 2.5 mm. long, linear-subulate, strigose. Calyx 5 mm. narrowly tubular in flower, widening in fruit, with 1 strong hirsute rib running from the base of the calyx to the apex of each tooth and with 1 (less commonly 2) secondary ribs between them which terminate at the sinus; teeth 1.6 mm. long, lanceolate-subulate, rigid, bristle-tipped. Corolla usually bright yellow, occasionally red or white (varying in size with that of the plant), in well-grown specimens 6 mm. across; tube 10 mm. long, pubescent or glabrous outside, much incurved at top beneath the limb; upper lip not half as long as the lower, broad, scarcely emarginate; lower lip deeply 3-lobed, the lobes obovate-oblong, obtuse. Capsules 5 mm. long, oblong-ellipsoid. Seeds minute, irregular.

Distribution: Bengal, Punjab, Tenasserim, Sind, W. Peninsula, Ceylon, Siam, Java, China, Arabia, tropical and S. Africa, Madagascar.

The plant is pungent, bitter; indigestible; improves both appetite and taste; useful in "kapha" and "vata", strangury and diseases of the blood (Ayurveda).

Gujerati: Agiyo, Gholoagio—; *Marathi:* Laghukurandika—; *Sanskrit:* Agnivriksha, Kshetrabhusha, Kshetranashini, Kurandika, Kuranti—; *South Africa:* Witchweed—; *Zulu:* isOna—.

2. **Striga orobanchoides** Benth. in Hook. Comp. Bot. Mag I (1835) 361, t. 19.

A small erect glabrous or puberulous herb 15-30 cm. high, parasitic on roots or growing on rocks. Stems many from a tuberous root, simple or branched, dark reddish-purple. Leaves scale-like, ovate-oblong, acute, dark reddish-purple like the stems, passing into floral bracts. Flowers numerous, sessile, erect, in erect usually densely flowered terminal spikes; floral bracts ovate-lanceolate, acute, a little shorter than the calyx; bracteoles rather more than half as long as the calyx, linear-lanceolate, acute, ciliolate. Calyx exceeding 6 mm. long, 5- or 4- ribbed; teeth 5 or 4, about one-third as long as the tube, narrowly lanceolate, very acute, bristle-tipped. Corolla 2-lipped, pink, with a white spot at the base of each of its lobes; tube reaching 13 mm. long, incurved above the middle, with hairs in the throat; limb about 6 mm. across, the upper lip deeply divided, the lobes obovate-oblong, rounded, the lower lip 3-lobed to about half way down, the lobes obtuse. Capsules oblong-ellipsoid, 6 mm. long, tipped with the base of the style. Seeds oblong, 0.6 mm. long.

Distribution: W. Peninsula, Ceylon.—Arabia, tropical and S. Africa.

The plant is used in diabetes.

Gujerati: Ratoagio—; *Hindi:* Lalagia—; *Marathi:* Tambadikarichagvat.

Sopubia Ham.

Erect herbs. Leaves opposite or the upper alternate, narrow, often laciniate. Flowers spicate or racemose; bracts leafy; bracteoles 2. Calyx campanulate; lobes 5, narrow. Corolla infundibuliform; tube short, the throat dilated; lobes 5, broad, spreading, subequal,

the 2 upper inmost in bud. Stamens 4, didynamous; anthers of upper or both pairs of stamens in contact by pairs, one cell of each stamen perfect, ovoid, the other empty and stipitate. Ovary 2-celled; ovules many in each cell; style simple; stigma thickened, sublinguiform, obtuse. Capsule ovoid or oblong, rounded or compressed, retuse or notched, loculicidal; valves entire or 2-fid, separating from the placentiferous dissepiment. Seeds numerous; testa somewhat lax. —Species 20.—Palæotropics.

S. cana Harv. is used medicinally in South Africa.

1. **Sopubia delphinifolia** G. Don Gen. Syst. IV. (1837) 560.—Plate 701A.

Stem 0.3-0.9 m. high, erect, subquadrangular, grooved, much-branched, pubescent or glabrous, often spotted with purple. Leaves opposite, 2.5-3.8 cm. long, pinnatisect; segments few, long, filiform, distant, spreading, flexuous, often ciliate with minute hairs, the uppermost passing into long simple floral leaves (bracts). Flowers numerous, axillary, solitary or in few-flowered terminal racemes; bracteoles on the pedicels a little below the calyx 1.3 cm. long, filiform; pedicels 3-6 mm. long, slender. Calyx 2 cm. long, glabrous; tube 6 mm. long, strongly ribbed; teeth long, linear-subulate, erect, 1.3 cm. long. Corolla 2.5-3.8 cm. long, rose-coloured; limb 2 cm. across, with broad spreading lobes. Filaments hairy. Capsules 6 mm. long, oblong-ellipsoid. Seeds scarcely 0.8 mm. long, cuneate-oblong, striate, usually truncate at one end.

Distribution: Bihar, Chota Nagpur, Konkan, W. Ghats, Deccan, Carnatic, Ceylon.

The juice of the plant is applied by field labourers in the Deccan to their feet to heal sores caused by exposure to moisture. It is astringent and stains the skin at first yellow and afterwards a black colour.

Bombay: Dudhali—; *Mundari:* Dahusir, Loeonghusir—.

Pedicularis Linn.

Annual or perennial herbs. Leaves alternate opposite or whorled, simple toothed pinnatifid or pinnatisect. Flowers bracteate in terminal spikes or racemes, ebracteolate. Calyx tubular or

campanulate, entire or split above and often below, 2-5-toothed, lateral teeth free or connate entire or crested, lower small or 0. Corolla 2-lipped, tube cylindric; upper lip erect, compressed straight falcate annular or decurved, obtuse acute or beaked, lower with 3 spreading erect or deflexed lobes. Stamens 4, didynamous; anthers under the upper lip meeting in pairs; cells distinct, equal, parallel, bases obtuse or rarely awned. Style slender, stigma subcapitate. Capsule compressed, ovate or lanceolate, falcate or oblique, often obliquely beaked, loculicidal; valves placentiferous, often cohering to the middle. Seeds numerous, of various shapes, testa appressed or lax, reticulate pitted striate or ribbed.—Species 275.—N. hemisphere, S. America, especially on mountains.

1. Capsule 13 mm. long, ovoid, acute; tip exserted .... 1. *P. pectinata.*
2. Capsule 13-8 mm. long, broadly oblong, oblique, acute, half-exserted or less .... 2. *P. siphonantha.*

Diuretic, astringent, and resolvent.

P. palustris Linn. is used medicinally in Europe; *P. gloriosa* Biss. and Mre. and *P. resupinata* Linn. in China.

1. **Pedicularis pectinata** Wall. Cat. no. 420.—Plate 702.

Nearly glabrous, 15-75 cm. Radical leaves persistent, long-stalked, lanceolate, 7.5-12.5 by 5-7.5 cm., pinnatifid; segments toothed, sometimes again pinnatifid. Stem-leaves whorled, stalked, lanceolate, 7.5 by 5 cm., pinnatifid; segments toothed. Flowers pink, spicate. Calyx-teeth 5, entire, acute. Corolla 2 cm. long; tube as long as the calyx; beak sickle-shaped, tip recurved. Stamens attached at the bottom of the tube; filaments hairy. Capsule 1.3 cm., ovoid, acute.

Distribution: W. Himalaya, 7,000—11,000 ft., from Kashmir to Kumaon.—Afghanistan.

In Kanawar, the pounded leaves are given for hæmoptysis.

The plant is used as a diuretic in the Punjab.

Punjab: Mishran—.

2. **Pedicularis siphonantha** Don Prodr. 95; Blatter Beautiful Fl. Kashmir II (1928) 97.—Plate 703.

Hairless or hairy. Stem 2.5-35 cm. high, prostrate or ascending. Radical leaves tufted, stalked, pinnately cut; segments 8-15 pairs,

lanceolate or ovate, pinnatifid or dentate, 2-13 mm. long; stem-leaves few, scattered, short-stalked. Flowers pink, or rose-pink, or deep purple, or the upper lip deep purple and lower lip and tube pale pink, or white or pink outside and white within, or cherry-coloured with splashes of white, or pink with white centre, axillary, stalked, forming dense racemes; flower-stalks 5-8 mm. Calyx ovate, 8-13 mm. long, 3-toothed, uppermost segment awl-shaped or absent, entire, lateral ones ovate, dentate. Corolla-tube 2-5 times as long as the calyx, 2-7 cm. long; lower lip 3-fid, hairy on the margin, 1.5-2 cm. broad, lateral lobes almost rounded, midlobe notched at the tip; upper lip rolled inwards, basal part 2-4 mm., erect, throat with 2 teeth or lobes or entire, anther-bearing part sickle-shaped, 4 by 2.5 mm., passing into a 2-fid, 8 mm. long beak. Stamens inserted at the top of the tube, front-filaments hairy. Stigma protruding. Capsule 2 cm. by 6 mm., ovate-oblong, long-pointed. Seeds 2 mm. long, ovate, pale, distinctly netted.

Distribution: Alpine Himalaya, from Kashmir to Sikkim, 11,000—16,000 ft.—Afghanistan, Persia, China.

The plant is used as a diuretic in the Punjab.

OROBANCHACEAE.

Perennial root-parasites without leaves or chlorophyll; stem usually simple, stout or slender, scaly. Flowers hermaphrodite, irregular, solitary or in spikes or racemes; bracts large, scale-like; bracteoles 1-2, scale-like or 0. Calyx spathaceous or 2-lipped, or with 4-5 free or connate segments. Corolla hypogynous, curved, usually distinctly 2-lipped (occasionally subequally 5-lobed); upper lip often vaulted, throat usually with 2 villous folds. Stamens didynamous, inserted on the corolla-tube; anthers 1-2-celled, the cells frequently spurred at the base, opening by slits or apical pores, 1 cell often imperfect. Disk glandular or unilateral or 0. Ovary of 2 (rarely 3) connate carpels 1- (rarely 2-) celled; ovules many (rarely

few), anatropous, on 2 (rarely 3) pairs of free or confluent parietal placentæ which sometimes ultimately meet in the centre of the ovary. Capsule usually 1-celled, sometimes imperfectly or perfectly 2-celled; valves 2 (rarely 3). Seeds many, minute; testa usually pitted or tuberculate; albumen fleshy; embryo ovoid, often undivided.—Genera 12. Species 140.—Chiefly N. temperate of the Old World, a few American and tropical.

1. Corolla-lobes all broad, subequal
   Anther-cells equal .... CISTANCHE.
2. Corolla 2-lipped, the upper lip 2-lobed, the lower lip 3-lobed .... OROBANCHE.

Some of these notorious parasites were fomerly used medicinally, but have fallen into disuse.

The presence of a glucoside, orobanchin, has been reported.

CISTANCHE Hoffmgg. & Link.

Scapigerous herbs; scape or stem simple, scaly. Flowers in dense spikes, yellow, violet, or purple; bracteoles 2. Calyx broadly tubular-campanulate; lobes 5, subequal, obtuse. Corolla-tube long, curved, dilated above; limb spreading, oblique, with 5 broad subequal lobes. Stamens 4, subexserted; anthers subtransverse, often villous, the cells equal, parallel, bases obtuse. Ovary 1-celled; placentæ 4, equidistant or in pairs; stigma broad. Capsule ovoid, laterally compressed, 4-valved to the base. Seeds numerous, subglobose, reticulately punctate.—Species 12.—Mediterranean, Africa, Asia.

The genus is therapeutically inert.

1. **Cistanche tubulosa** Wight. Ic. t. 1420 bis (1850).

General colour of plant yellow with an occasional tinge of purple; stem 1.3 cm. to 1.5 m. high, sometimes reaching 5 cm. diam., unbranched, furrowed, fleshy, glabrous or more or less pubescent, densely covered with triangular acute scales. Flowers numerous, in dense spikes 15-25 cm. long, sometimes 7.5 cm. diam.; bracts lanceolate, with membranous margins, acuminate, longer than the calyx; bracteoles with membranous margins shorter than the calyx, linear-lanceolate. Calyx tubular-campanulate, 1.3-2 cm. long; lobes about

1/3 as long as the tube, rounded, subequal, with membranous margins, veined. Corolla yellow, hairy at the base inside, 2.5-5 cm. long, the lower half tubular, erect, the upper half campanulate, bent outwards from the middle; limb shortly 5-lobed, the lobes rounded, reflexed. Filaments woolly at the base; anthers subexserted, woolly, not or scarcely apiculate. Placentæ 4, subequidistant. Style exserted, curved below the stigma. Capsules 2.5 cm. long, ovoid-oblong, laterally compressed, beaked. Seeds numerous, subglobose, 1.25 mm. diam., deeply pitted.

Distribution: Punjab, Sind, Baluchistan.

In Jhalawan and Kalat, it is given with curds to stop diarrhœa (Hughes-Buller).

Jhalawan: Kasi—; *Kalat:* Kasi—.

OROBANCHE Linn.

Scapigerous scaly herbs; scapes or stems simple or branched, stout or slender; scales acute. Flowers in dense or lax or interrupted spikes or racemes; bracts scale-like; bracteoles 2 or 0. Calyx unequally 4-fid or 2-partite from back to front, the segments entire or 2-fid with rarely a 5th tooth or segment. Corolla 2-lipped; tube curved, dilated above, circumscissile below; upper lip erect, crenulate, notched or 2-fid; lower somewhat spreading, 3-lobed. Stamens 4, didynamous, included; anther-cells equal, parallel, the bases usually mucronate. Disk 0 or glandular. Ovary 1-celled; placentæ 4, equidistant or paired; ovules very many; style simple; stigma funnel-shaped or peltate, or more or less laterally 2-lobed. Capsule 2-valved, the valves often cohering with the style. Seeds very many, small, subglobose or ovoid.—Species 90.—Temperate and subtropical.

The genus is therapeutically inert.

1. **Orobanche aegyptiaca** Pers. Syn. II (1807) 181.—*O. indica* Ham. in Roxb. Fl. Ind. III (1832) 27.

Stem 10-50 cm. high, more or less branched from the base; scales few, lanceolate, sparingly pubescent or glabrescent, 5-15 mm. long. Flowers sessile, or the lower shortly pedicellate, numerous, in cylindric

spikes which are at first condensed, afterwards usually lax, the lower flowers often remote; bracts lanceolate, pubescent; bracteoles narrowly linear, shorter than the calyx. Calyx pubescent, 1 cm. long, campanulate, 4-toothed, submembranous; teeth lanceolate-subulate from a broad base, about equalling the tube and with a strong midnerve. Corolla 2-3.2 cm. long, pubescent outside, the upper part blue or lilac, the lower part nearly white; upper lip 2-lobed, the lobes obtuse or subacute; lower lip equally 3-lobed, the lobes usually rounded, tube slightly curved near the top, constricted above the insertion of the stamens about 6 mm. above the base. Filaments inserted low down in the tube, pubescent at the base; anthers obovate, woolly, the cells usually separating from a mucronate base. Stigma large, with 2 nearly semicircular lobes. Capsules nearly 1.3 cm. long, oblong, acuminate, glabrous, 2-valved. Ripe seeds about 0.6 mm. diam., subglobose or ovoid, reticulate.

Distribution: More or less throughout India, Baluchistan.—Central and W. Asia.

In Loralai, it is used as a cure for boils in the throat of cattle. In the Pab Hills and in Jhalawan, it is used to stop diarrhœa (Hughes-Buller).

Jhalawan: Kasisang—; *Loralai:* Khargeni—; *Pab Hills:* Kasisang—; *Persian:* Subzgul—; *Pushtu:* Masosak—; *Quetta-Pishin:* Matsosak—.

LENTIBULARIACEAE.

Herbs, aquatic or in wet places, often insectivorous. Leaves rosulate or, when submerged, capillaceo-multifid, sometimes obsolete. Flowers irregular, hermaphrodite, in 1-many-flowered simple or branched scapes; bracts small or 0; bracteoles 2 or 0. Calyx inferior, 2-5- lobed or -partite. Corolla 2-lipped, spurred; the upper lip usually the smaller, entire or emarginate, the lower usually much larger, 3-5-lobed. Stamens 2, attached to the base of the corolla; filaments curved; anthers 2-celled, dorsifixed, the cells transversely confluent, longitudinally dehiscing. Ovary 1-celled, globose; ovules very many,

on a free basal placenta; style short; stigma unequally 2-lobed. Seeds very many, minute, exalbuminous.—Genera 10. Species 250. —Cosmopolitan.

The Order is therapeutically inert.

UTRICULARIA Linn.

Herbs, floating and rootless, or, on wet ground and rocks, rooting among other plants, sometimes twining, often furnished with minute bladder-like insect traps, sometimes also in floating species with floating supports to the scape. Leaves in floating species multifid with capillary segments, in erect or twining species entire. Flowers on simple or branched scapes, racemose; pedicels bracteate and often bibracteolate. Calyx 2-partite; lobes entire or nearly so, often accrescent. Corolla 2-lipped, the upper lip entire or emarginate, the lower larger and lobed, the spur straight or curved. Stamens 2; filaments broad. Ovary 1-celled, many-ovuled. Seeds of various shapes, minute, the testa often lax and reticulate.—Species 210.—Tropical and temperate.

The genus is therapeutically inert.

1. **Utricularia bifida** Linn. Sp. Pl. (1753) 18; Bot. Mag. t. 6689.

Stems filiform, creeping, much-branched. Leaves 2.5-5 cm., linear, bearing sessile bladders at the base, usually withered before flowering. Flowering stems 7.5-25 cm., erect, slender, with 2 or 3 distant lanceolate acute scales; flowers 2-10, on short recurved pedicels, distant. Sepals ovate, obtuse, greatly enlarged in fruit. Corolla rather small, lower lip 6 mm. diam., spur rather over 6 mm., slightly curved, pointed. Capsule much shorter than enlarged membranous sepals. Seeds not compressed, reticulate.

Distribution: Tropical Asia generally.

In Chota Nagpur, the plant is used in urinary diseases.

Santali: Arakjhawar—.

BIGNONIACEAE.

Trees or shrubs. Leaves opposite, 1-3 times unequally pinnate or sometimes undivided. Flowers hermaphrodite, irregular, in racemes or panicles usually terminal; bracts 0. Calyx gamosepalous, campanulate or spathaceous; lobes 2-5 or 0. Corolla 2-lipped, tubular-ventricose; lobes 5, subequal, imbricate in bud. Stamens 4, didynamous, often with an imperfect (in OROXYLUM a perfect) fifth inserted where the corolla-tube is suddenly swollen; anthers 2-celled, included or shortly exserted; cells elliptic or oblong, parallel or divaricate, with longitudinal dehiscence. Disk usually thick or annular. Ovary subsessile, 2-celled; ovules numerous, in many rows (rarely 1-2 rows), anatropous; style long, glabrous; stigma of 2 elliptic lobes. Capsules mostly elongate, loculicidally or septicidally 2-valved; septum enlarging in fruit, deciduous with the placentæ. Seeds compressed, discoid (rarely subtrigonous), usually prominently winged; albumen 0.—Genera about 100. Species 800.—Tropics.

A. Herbs. Leaves alternate, one pinnate .... AMPHICOME.
B. Woody plants
 I. Perfect stamens 5 .... OROXYLUM.
 II. Perfect stamens 4
  a. Leaves simple .... TECOMELLA.
  b. Leaves pinnate
   Capsule not winged, cylindric or sub-quadrangular
    1. Calyx spathaceous, cleft to the base on one side in flower. Corolla-tube not ventricose ... DOLICHANDRONE.
    2. Calyx closed in bud, in flower broadly 2-5-lobed .... CRESCENTIA.
    3. Calyx not spathaceous, equally 5-toothed. Septum compressed .... TECOMA.
    4. Calyx not spathaceous. Corolla-tube ventricose
     * Capsule with a flat or angular dissepiment .... HETEROPHRAGMA.
     ** Capsule with a cylindrical spongy dissepiment
      o. Ovules biseriate in each cell. Seeds sunk in deep pits in the placenta .... STERROSPERMUM.
      oo. Ovules many-seriate in each cell. Seeds flat, not ridged, not sunk in the placenta .... RADERMACHERA.

The roots are sedative, astringent and antidysenteric, diuretic, and hydragogue.

OROXYLUM Vent.

A glabrous usually small tree. Leaves opposite, large, 2-3-pinnate; leaflets entire, ovate. Flowers in long terminal racemes. Calyx large, campanulate, coriaceous; limb truncate or obscurely toothed, persistent. Corolla large, campanulate, purplish or white; lobes 5, round, crisped, toothed, subequal. Stamens 5, perfect, exserted; filaments straight, 4 of them subequal, the fifth one shorter; anthers 2-celled, the cells parallel, oblong. Disk large, cushion-like. Ovary 2-celled, subsessile, contracted below; ovules numerous, many-seriate; style long; stigma of 2 large blades. Capsule very large, broadly linear, strongly compressed parallel to the septum, 2-valved, opening septifragally. Seeds many, thinly discoid, with a broad hyaline wing.—Species 1.—Indo-Malayan.

1. **Oroxylum indicum** Vent. Dec. Gen. Nov. (1808) 8.—*Calosanthes indica* Blume Bijdr. 761; Wight Ic. t. 1337-38.—PLATE 704.

A small tree 7.5-12 m. high, branched at top; bark light brown, soft, with green juice and often with numerous corky lenticels. Leaves very large, 0.9-1.5 m. long, 2-3-pinnate with opposite pinnæ; rhachis very stout, cylindric; leaflets 2-4 pairs, 6.3-12.5 by 3.8-10 cm., ovate or elliptic, acuminate, glabrous, base rounded or sometimes cordate; petiolules of the lateral leaflets 6-15 mm. long. Flowers numerous, fetid, in large erect racemes 30-60 cm. long or even more; pedicels 0.6-3.2 cm. long. Calyx 2.5 by 2 cm., leathery, oblong-campanulate, glabrous. Corolla usually lurid-purple, reaching 10 cm. long, fleshy; lobes about 3.8 cm. long with crisped margins. Stamens 5, slightly exserted beyond the corolla-tube, one of them a little shorter than the other 4; filaments cottony at the base. Capsules 0.3-0.9 m. by 5-9 cm., straight, tapering to both ends, flat, hardly 8 mm. thick, acute; valves semiwoody. Seeds very numerous, 6.3 cm. long, winged all round except at the base.

Distribution: Throughout India, except in the western drier area, Ceylon.—Malaya, Cochin-China, Ava.

The root bark is acrid, bitter, pungent; astringent to the bowels, cooling, aphrodisiac, tonic; increases appetite; useful in "vata",

biliousness, fevers, bronchitis, intestinal worms, vomiting, dysentery, leucoderma, asthma, inflammation, anal troubles.—The fruit is acrid, sweet; stomachic, anthelmintic; good in diseases of the heart and the throat, piles, bronchitis (Ayurveda).

The fruit is an expectorant; improves the appetite; useful in leucoderma (Yunani).

In Hindu medicine the root-bark is considered astringent, tonic, and useful in diarrhœa and dysentery. The tender fruits are described as grateful, carminative and stomachic.

An oil, prepared by boiling a paste made of the root-bark with sesamum oil, is recommended for otorrhea.

The Gonds employ a decoction of the bark as a discutient application to rheumatic swellings. The powder and infusion of the bark are diaphoretic, and useful in acute rheumatism.

A powder made from the bark along with *hurdi,* is a useful cure for the sore-backs of horses.

The seeds are purgative.

The Sinhalese use the bark as a bitter tonic.

The root, bark, stem, and leaf are prescribed for snake-bite (Charaka, Sushruta); the stem and wood for scorpion-sting (Sushruta). No part of the plant is an antidote to either snake-venom (Mhaskar and Caius) or scorpion-venom (Caius and Mhaskar).

Almora: Pharkat—; *Andamans:* Baladah—; *Assam:* Kering—; *Bengal:* Nasona, Sanpatti, Sona— *Bombay:* Karkath, Phalphura, Saunaassar, Tantun, Tetu, Ulu—; *Burma:* Kyaungya, Kyoungsha, Kyoungyabeng—; *Canarese:* Alangi, Anemungu, Bagi, Dundukara, Hore, Mokka, Nala, Sonepatte, Tetu, Tigadi—; *Cantonese:* Ts'in t'sang tai—; *Central Provinces:* Tattunua—; *Chinese:* Ch'ien Ts'eng Ti—; *Dehra Dun:* Pharnat, Pharrai, Tarlu—; *English:* Indian Trumpet Flower—; *Garhwal:* Tantia—; *Gond:* Dhatte—; *Gujerati:* Podval, Tetu—; *Hindi:* Arlu, Assarsauna, Kharkath, Pharkhat, Pharrai, Pharri, Sauna, Shyona, Ullu—; *Kadir:* Chorikkonna—; *Khond:* Dokeri—; *Kolami:* Arengebaung, Arengibanu, Somepatta—; *Konkani:* Dovondik—; *Malay:* Bulai—; *Malaya:* Chin chang chee—; *Malayalam:* Aralu, Arantal, Palakapayani, Veluttapatiri—; *Marathi:* Taitu, Tetu, Ulu—; *Mechi:* Cherpong—; *Nepal:* Karamkanda,

Totilla, Totola—; *Oudh:* Sanna—; *Palamow:* Dakdawa, Ginsen, Sicat—; *Punjab:* Miringa, Mulin, Sori, Tatmorang, Tatpalang—; *Rajbanshi:* Soizong—; *Sanskrit:* Adhvantashatrava, Arala, Araluka, Aratu, Bhalluka, Bhantuka, Bhutapushpa, Bhutataka, Dirghavrinta, Dirghavrintaka, Kandarpa, Katambhara, Katanga, Katvanga, Kurkata, Kutannata, Mandukaparna, Mayurajangha, Nata, Padavriksha, Paripadapa, Patrorna, Prithushimba, Priyajiva, Priyajivi, Putivriksha, Ruksha, Shallaka, Shona, Shoshana, Shukanasa, Shyonaka, Svarnavalkala, Tuntaka, Vatu, Vishanut—; *Santal:* Banahatak—; *Sinhalese:* Totilla—; *Tagalog:* Alangabang, Balilangcoac, Pincapinca, Pincapincahan—; *Tamil:* Achi, Arandai, Arulandai, Palaiyudaichi, Pana, Peyarulandai, Pudabudham, Vangam—; *Telugu:* Dundilamu, Mandukaparnamu, Mokkavepa, Pampena, Peddakatti, Sukanasamu—; *Tulu:* Anemungu—; *Urdu:* Arlu—; *Uriya:* Phompania, Pompidi, Sono—; *Visayan:* Abangabang, Alongabong—.

TECOMELLA Seem.

A glaucescent shrub or small tree. Leaves usually opposite, simple, oblong, obtuse, entire. Flowers in terminal racemes or panicles. Calyx tubular-campanulate, subequally 5-toothed. Corolla tubular-campanulate, ventricose with a wide mouth; lobes rounded, subequal, imbricate. Stamens exserted; anther-cells divergent and pendulous. Disk cupular. Ovary oblong; ovules numerous in each cell. Capsule linear-oblong, more or less compressed at right angles to the septum; valves opening loculicidally. Seeds discoid, winged, the wing absent at the base of the seed and very narrow at its apex. —Species 1.—Arabia, S.-W. Asia.

1. **Tecomella undulata** Seem. in Ann. and Mag. Nat. Hist. ser. 3, X (1862) 30.—*Tecoma undulata* G. Don Gen. Syst. IV (1837) 223.—PLATE 701B (under *Tecoma undulata* G. Don).

A shrub or small tree with drooping branches and stellately grey-tomentose innovations, otherwise glabrous. Leaves simple, 5-12.5 by 1-3.2 cm., narrowly oblong, obtuse, entire with undulate margins. Flowers inodorous, in corymbose few-flowered racemes terminating short lateral branches; pedicels 6-13 mm. long. Calyx

9.5-11 mm. long, campanulate; lobes 3 mm. long, broadly ovate, obtuse, mucronate. Corolla 3.8-6.3 cm. long, orange-yellow, campanulate, veined; lobes 5, subequal, rounded. Stamens exserted; filaments glabrous. Stigma 2-lamellate; lobes spathulate-oblong, rounded. Capsules 20 by 1 cm., slightly curved, linear-oblong, acute, smooth; valves thin. Seeds (including the wing) 2.5 by 1 cm.; wing very narrow round the apex of the seed, absent at its base.

Distribution: Punjab, Waziristan, Baluchistan, Rajputana, Sind, Kathiawar, Gujarat, Deccan.—Arabia.

The medicinal properties are the same as those of *Aphanamixis polystichia;* the plant is also useful in urinary discharges due to "kapha", "pitta", enlargement of the spleen, leucorrhœa, leucoderma (Ayurveda).

The bark of the young branches is often employed in Sind as a remedy for syphilis (Murray).

In Bolan, it is used as a cure for liver diseases. At Wad in Kalat, it is used as a cure for fever (Hughes-Buller).

Baluchistan: Rori—; *Bolan:* Parpuk—; *Bombay:* Lohero, Lohuri, Rakhtreora, Rugtrora, Roira—; *Hindi:* Rugtrora—; *Las Bela:* Lahiru—; *Marathi:* Rakhtreora, Rakhtroda, Raktarohida—; *Merwara:* Rohera, Roira—; *Punjab:* Lahura, Luar, Rohira, Roir—; *Pushtu:* Raidawan, Rebdan, Rebdun, Regdawan, Reodan—; *Sanskrit:* Chalachhada, Dadimpushpasanjinaka, Kushalmali, Kutashalmali, Mansadalana, Plihanashana, Plihari, Raktaghna, Raktaprasadana, Raktapushpa, Rohi, Rohina, Rohita, Rohitaka, Ruchya, Sadaprasuna, Sadapushpa, Shalmalika, Virochana, Yakridvairi—; *Sind:* Khen, Lahero, Lohera, Lohira, Lohuri—; *Wad:* Parpuk—.

DOLICHANDRONE Fenzl.

Trees. Leaves opposite, pinnate, the leaflets entire or obscurely toothed. Flowers few, opening at night, usually white, large or moderate sized, in terminal corymbs or panicles. Calyx spathaceous, cleft to the base on one side. Corolla-tube long or short; lobes 5,

nearly equal, crisped on the margin. Stamens 4, didynamous, included; anthers glabrous, the cells parallel. Disk annular. Ovary sessile; ovules numerous, many-seriate; style long; stigma 2-lobed. Fruit a long subterete or compressed capsule, loculicidally 2-valved; the septum narrow with a transverse false septum, making seemingly 4 cells. Seeds much compressed, almost rectangular, with broad wings on each side; cotyledons usually broader than long, emarginate. —Species 10.—Madagascar to Malaya.

1. Leaflets 3-4 pairs with an odd one .... 1. *D. spathacea.*
2. Leaflets 5-7 .... 2. *D. falcata.*

The genus is not therapeutically defined.

1. **Dolichandrone spathacea** K. Schum. Fl. Kaiser Wilh. Land (1889) 123.—*D. Rheedii* Seem. in Journ. Bot. (1870) 380.—*Spathodea Rheedii* Spreng Syst. II (1825) 835; Wight Ic. t. 1339.

A tree about 9 m. high, branchlets stout, marked with prominent leaf-scars, lenticellate, young shoots glabrous. Leaves imparipinnate, rhachis 20-30 cm., swollen at base and joints, cylindrical, channelled above, glabrous; leaflets 7 or 9 (3 or 4 pairs and terminal one), articulated, distant, shortly stalked, 10-15 cm., ovate-lanceolate, usually rounded, often unequal-sided at base, acuminate-caudate, entire, glabrous and shining, veins prominent beneath, often purple. Flowers 3 or 4 together on short, stout, erect pedicels. Calyx over 5 cm., completely closed and with a curved beak in bud, afterwards splitting to base, deciduous by a circular fission at base. Corolla-tube 15 cm.; cylindrical, upper part funnel-shaped, limb 6.3-7.5 cm. diam., lobes rounded, much crisped and crenate on margin; Capsule about 45 cm., ovoid on section, bluntly pointed, smooth, purplish brown. Seeds overlapping in many rows, 1.5 cm., flat, rectangular, white.

Distribution: Malabar, Travancore, Ceylon, Sundribuns, Lower Burma, Andamans, Nicobars, Malay Peninsula.—Sumatra, Java, Timor, Philippines, Borneo, Celebes, Amboina, New Guinea, Solomon Islands, New Caledonia.

The seeds with ginger and *Pavetta* root are administered in spasmodic affections (Rheede).

Burma: Thakutma—; *Ceylon:* Vilpadri—; *Malay:* Poco Kulo—; *Malayalam:* Nirponnalyam—; *Sinhalese:* Daanga, Deyadanga—; *Tamil:* Attukombudi, Kanbillai, Peruppumbadiri, Viribadiri—.

2. **Dolichandrone falcata** Seem. in Journ. Bot. VIII (1870) 381.—Plate 705.

A deciduous tree 6-15 m. high, the young parts pubescent or shortly villous. Leaves simply pinnate, 7.5-15 cm. long; leaflets opposite, 1.3-3.8 by 1.1-3.8 cm., suborbicular or obovate, sometimes very shortly acuminate (the terminal leaflet rather larger than the lateral ones), pubescent or glabrous, base cuneate or rounded, usually unequal-sided; main nerves about 4 pairs, conspicuous beneath; petiolules of the lateral leaflets 0-2.5 mm. long. Flowers in terminal few-flowered racemes; pedicels 1.3 cm. long. Calyx 1.3-2 cm. long, pubescent, with a short stout mucro at the apex. Corolla white, 2.5 cm. long or even more; tube very narrow (about 2.5 mm.) at its base, gradually enlarging upwards; lobes of the limb obovate-oblong with crisped undulate margins. Capsules flat, much falcately curved, 25-45 cm. long by 2 cm. wide, glabrous. Seeds 2.5 cm. long by 6 mm. broad, rectangular, winged at the 2 ends.

Distribution: Rajputana, Bundelkhand, Bihar, C. Provinces, Berar, Konkan, Deccan, Mysore, most forests of Madras Presidency.

A decoction of the fruit is used medicinally.

It has the reputation of being used to procure abortion, and the bark is, it is stated, used as a fish poison.

Banswara: Manchingi, Mendal—; *Bombay:* Kanseri, Manchingi, Mendal, Messinge—; *Canarese:* Godmurki, Muduvudure, Udure—; *Central Provnces:* Bhil, Dudga, Mersingh—; *Kurku:* Karanjelo—; *Lambadi:* Nuram—; *Malayalam:* Nirpponnalyam—; *Marathi:* Bhersing, Medasingi, Medshing, Mersingi, Mersinghi—; *Meywar:* Kanseri—; *Oudh:* Hawar—; *Tamil:* Kadalatti, Kaliyacha, Kattuvarucham, Keluvarbandam, Pasalatti, Udi—; *Telugu:* Chittiniruvoddi, Chittivoddi, Oddi—; *Uriya:* Mrygosingo—.

HETEROPHRAGMA DC.

Trees. Leaves large, 1-pinnate. Flowers large, in terminal velvety-tomentose panicles. Calyx ovoid, closed when young, irregularly 3-5-lobed in flower. Corolla tubular-ventricose, rosy, white or yellow; lobes 5, rounded, subequal. Stamens 4, didynamous, included; anthers glabrous, the cells linear-oblong, diverging. Disk cushion-shaped. Ovary sessile; ovules numerous, many-seriate on each placenta; style long; stigma 2-lobed. Capsule elongate, cylindric or more or less compressed, falcate or twisted, loculicidally 2-valved with a flat or 4-angled dissepiment. Seeds compressed, with a membranous wing at each end.—Species 5.—Africa, India.

The genus is therapeutically inert.

1. **Heterophragma roxburghii** DC. Prodr. IX (1845) 210. —*Bignonia quadrilocularis* Roxb. Corom. Pl. II, 24, t. 145.— PLATE 706.

A large tree with dark brown bark. Leaves simply pinnate, 0.3-0.6 m. long, tomentose when young, afterwards glabrous, usually crowded near the ends of the branches; leaflets 3-5 pairs and an odd one, 5-12.5 by 3.2-5 cm., elliptic-oblong, obtuse, sometimes with a short acumination, entire or serrulate, often unequal-sided at the base; petiolules of the lateral leaflets 0-6 mm. long. Flowers fragrant, in large, terminal, many-flowered densely fulvous-tomentose panicles; pedicels short, stout. Calyx 1.3-2 cm. long, densely tomentose outside, clothed inside with long silky tawny hairs, irregularly lobed $^1/_3$—$^1/_2$-way down, or on one side more deeply divided, or obscurely 2-lipped. Corolla reaching 5 cm. long or more, pale rose-coloured or white, often with a pink margin; tube pubescent outside when young, usually becoming glabrous; mouth of the limb 5 cm. across, the lobes about 1.3 cm. long with crisped margins. Filaments densely woolly at the very base, otherwise glabrous. Capsules straight, 1.3 cm. thick, 20-30 by 3.8-5 cm., linear, pointed, velvety when young, afterwards glabrous; dissepiment 4-winged, making the capsule 4-celled. Seeds 3.8 by 2-2.5 cm.

Distribution: Central Provinces, Khandesh, Konkan, Deccan, S. M. Country, W. Ghats of Bombay and Madras Presidencies.

The natives extract from the wood a thick fluid like tar, which they use in skin diseases.

The root is prescribed for bites of vipers (Bapat); but it is not an antidote to viperine poison (Mhaskar and Caius).

Bombay: Pullung, Warras—; *Canarese:* Adwinuggi, Bechadi—; *Koya:* Kaligottu—; *Marathi:* Panlag, Pullung, Waras, Warras, Warsi, Wurus—; *Telugu:* Barukoligottu, Bondugu—.

Stereospermum Cham.

Trees. Leaves opposite, imparipinnate; leaflets entire or toothed. Flowers in large lax terminal panicles. Calyx campanulate, truncate or shortly and unequally 5-lobed. Corolla tubular-campanulate, curved, 2-lipped, the upper lip 2-, the lower 3- lobed; lobes nearly equal, rounded crisped toothed or laciniate. Stamens 4 didynamous with a 5th rudimentary, included; anthers glabrous, the cells divergent. Ovary sessile, elongate, 2-celled; ovules numerous, biseriate in each cell; style slender; stigmas 2. Disk cupular, fleshy. Fruit an elongate terete or 4-angled capsule, loculicidally 2-valved; septum thick, corky, cylindrical, pitted in alternating cavities to receive the seeds, the wings of which lie flat along it. Seeds trigonous, with a transverse groove without and a prominent ridge within; cotyledons folded, 2-lobed; radicle straight.—Species 12.—Tropical Africa and Asia.

1. Leaflets elliptic, cordate-acuminate, glabrous .... 1. *S. tetragonum.*
2. Leaflets broadly elliptic, acuminate or acute, entire or serrulate, young hairy .... 2. *S. suaveolens.*

Cooling, diuretic and tonic.

S. kunthianum Cham. is used medicinally in West Africa.

1. **Stereospermum tetragonum** DC. Prodr. IX (1845) 210. —*S. chelonoides* C. B. Clarke in Hook. f. Fl. Brit. Ind. IV, 382.—Plate 707 (under *S. chelonoides*).

A large deciduous tree, 9-18 m. high, with many spreading branches, glabrous or nearly so; bark thick, yellowish. Leaves 1-pinnate, 30-45 cm. long; leaflets 3-5 pairs and an odd one, 10-12.5

by 2.5-5 cm., elliptic, caudate-acuminate, glabrous, base acute or rounded, often unequal-sided; main nerves 8-10 pairs with reticulate venation between; petiolules of the lateral leaflets 1-1.3 cm. long. Flowers fragrant, in lax drooping terminal panicles with articulated slender glabrous branches. Calyx 6 mm. long, campanulate, glabrous, usually purple, shortly 3-5- toothed. Corolla 2 cm. long, yellow, veined and tinged with reddish purple, more or less pubescent outside, bearded inside on the lower, glabrous on the upper side; lobes of the limb rounded, crisped. Filaments with a short tuft of woolly hairs at the very base, otherwise glabrous. Capsules 0.3-0.6 m. by 1.3 cm., subquadrangular, curved, pointed, more or less spirally twisted, often dotted with white specks; dissepiment sub-cylindric, brown, with open notches to receive the seeds. Seeds 2.5-3.2 cm. long, readily splitting along the transverse furrow.

Distribution: Throughout moister India, Ceylon.—Ava.

The properties are the same as those of *S. suaveolens* (Ayurveda).

The roots, leaves and flowers are used in decoction as febrifuge.

The juice of the leaves, mixed with lime juice, is of use in maniacal cases.

Every part of the plant finds its way into snake remedies (Charaka, Sushruta, Vagbhata, Sharangdharasamhita); the flower and fruit are recommended for scorpion-sting (Sushruta). No part of the plant is an antidote to either snake-venom (Mhaskar and Caius) or scorpion-venom (Caius and Mhaskar).

Assam: Parolli—; *Bengal:* Atcapali, Dharmar, Paruli—; *Berar:* Taitu—; *Bhil:* Padurni—; *Bombay:* Kirsel, Padal, Padri, Paral, Tuatuka—; *Burma:* Thakhwotthpo, Thakuppo, Thakutpo—; *Cachar:* Pareyaauwal—; *Canarese:* Hadari, Kalludure, Kaludi, Karivudure, Mukarti, Malaili, Padari, Pudikekadunirudure, Puruli, Puvvulave—; *Coorg:* Malevudure, Najudi—; *Garo:* Bolzel—; *Gujerati:* Padeli—; *Hindi:* Pader, Padri, Parral—; *Kadir:* Karannavu—; *Kharwar:* Pandri—; *Khond:* Patoli—; *Kolami:* Kandior, Pondair—; *Konkani:* Padal—; *Lepcha:* Singyen—; *Lohardaga:* Pandair—; *Magahi:* Tsaingtsa—; *Malayalam:* Kachasthali, Karinkara, Kuberakshi, Patiri, Phaleruha, Pupatiri—; *Marathi:* Kirsel, Koosga, Padal, Padhri,

Padoli, Padul, Padvale, Tuatuka—; *Michi:* Sirpang—; *Nepal:* Parari—; *Portuguese:* Favas de cobra—; *Sanskrit:* Patoli—; *Sinhalese:* Elapalol, Lunumadala—; *Tamil:* Ambu, Ambuvagini, Appu, Kanavirukkam, Kural, Padalam, Padali, Padiri, Ponbadiri, Pumbadiri, Pungali, Vellaippadiri—; *Telugu:* Godalippulusu, Ishikarasi, Kaligottu, Magavepa, Pulakevalamu, Tagada—; *Tulu:* Kalmanasingi, Puruli, Puvulave, Tagada—; *Uriya:* Patoli—.

2. **Stereospermum suaveolens** DC. Prodr. IX (1845) 211; Wight Ic. t. 1342.—Plate 708.

A deciduous tree 9-18 m. high, more or less pubescent; young parts viscous-hairy. Leaves 0.3-0.6 m. long, simply pinnate; leaflets 3-4 pairs and an odd one 7.5-15 by 5-7.5 cm., broadly elliptic, usually acuminate, often serrulate, rough above, pubescent beneath, base usually rounded and unequal-sided; main nerves 6-8 pairs with reticulate venation between; petiolules of the lateral leaflets 2.5 mm. or less long. Flowers sweetly fragrant, in large lax trichotomous viscidly-hairy panicles. Calyx 1 cm. long, campanulate, viscidly hairy; lobes 3-5, short, broad. Corolla 2.5-3.8 cm. long, infundibuliform, dull purple, pubescent outside, bearded inside on the lower, glabrous on the upper side; limb oblique, 2-lipped; lobes rounded, crisped-crenate, the 3 lower lobes longer than the 2 upper. Filaments without a tuft of hairs at the base. Capsules 0.3-0.6 m. by 1.7 cm. straight, cylindric, slightly ribbed, somewhat rough with elevated whitish specks; valves thick, hard. Seeds 3.2 by 1.3 cm., with a long membranous wing at each end, the nucleus furrowed across the middle, sunk into the notches of the cylindric brown spongy dissepiment.

Distribution: Throughout India in drier localities than the foregoing species, often planted.

The root is bitter, heating; useful in "kapha", and "vata", inflammations, eructations, vomiting, asthma, fevers, diseases of the blood, thirst, loss of taste.—The flowers are acrid with a flavour; useful in "kapha" and "vata", bilious diarrhœa, burning sensations.—The fruit is useful in hiccough, leprosy, and strangury (Ayurveda).

The flowers rubbed up with honey are given to check hiccough. The root bark is an ingredient in *dasamula*. It is regarded as cooling, diuretic and tonic, and is generally used in combination with other medicines. The ashes of the plant are used in the preparation of alkaline water and caustic pastes.

In Tanjore, the flowers are taken in the form of a confection as an aphrodisiac.

Bengal: Ghunta, Mug, Parlu, Parul—; *Bhil:* Dan, Pan—; *Bombay:* Paddal, Pahad, Paral—; *Burma:* Kywemagyolein—; *Canarese:* Giri, Hadari, Hude, Hulave, Huvvulave, Kariguddadu, Padari, Padri, Patala—; *Central Provinces:* Pandri—; *Gond:* Padar, Untkatar—; *Hasada:* Daruhusuri, Husuridaru—; *Hindi:* Pad, Padal, Padaria, Padiala, Pandri, Paral, Parur, Pur, Purula—; *Kharwar:* Pandri—; *Kolami:* Hussi, Kandior—; *Koya:* Vivi—; *Kumaon:* Padeli, Padura—; *Kurku:* Padar—; *Lambadi:* Kenemanasingi—; *Lepcha:* Singyen—; *Malayalam:* Kuberakshi, Patiri, Phaleruha, Pupatiri—; *Marathi:* Kalagori, Kalgari, Padal, Padialu, Pahad, Parul, Patala, Patalo—; *Melghat:* Phalgataitu—; *Naguri:* Daruhusir, Husirdaru—; *Nellore:* Goddatipalusu, Padiri—; *Nepal:* Parari—; *North-Western Provinces:* Padal—; *Punjab:* Kalthaun, Padal, Summe—; *Sadani:* Pandair—; *Sanskrit:* Abhipriya, Alivallabha, Ambuvasani, Ambuvasi, Amova, Kachasthali, Kalavrinta, Kalavrinti, Kamaduti, Karbura, Krishnavrinta, Kokila, Kuberakshi, Kumbhi, Kumbhika, Madhuduti, Patala, Patali, Phaleruha, Sthali, Sthiragandha, Supushpika, Tamrapushpi, Toyadhivasini, Toyapushpi, Vasantaduti—; *Santal:* Pader—; *Tamil:* Ambu, Ambuvagini, Appu, Padiri, Pumbadiri, Pyuppadiri—; *Telugu:* Ambuvasini, Kaligotu, Kokkesa, Kuberakshi, Magavepa, Patala, Patali—; *Tulu:* Kalmanasingi, Pulave—; *Uriya:* Patoli, Poridi—.

RADERMACHERA Zoll. & Moritz.

Trees. Leaves opposite, 1-3-pinnate; leaflets petiolulate, entire. Flowers large, in terminal racemes, corymbs or panicles. Calyx campanulate, truncate or shortly lobed. Corolla funnel-shaped or campanulate; tube short; limb subbilabiate, the lobes spreading,

rounded. Stamens 4, didynamous, with a rudimentary fifth, included; filaments slender; anther-cells divaricate. Ovary cylindrical, 2-celled; ovules very numerous, in many rows in each cell; style slender; stigma linguiform. Fruit an elongate, often twisted capsule; valves 2, woody; septum spongy, faintly pitted and bearing on each side a double row of seeds. Seeds small, flat, with a membranous wing at each end; cotyledons flat, not folded; internal testa thin; radicle minute.—Species 8.—Indo-Malayan.

The genus is therapeutically inert.

1. **Radermachera xylocarpa** K. Schum. in Engl. & Prantl. Pflanzenf. 4, 3B (1895) 243.—*Stereospermum xylocarpum* Benth. & Hook. f. Gen. Pl. II, 1047.—*Bignonia xylocarpa* Roxb. Fl. Ind. III (1832) 108; Wight Ic. t. 1335-36.—PLATE 709 (under *Stereospermum xylocarpum* Benth. & Hook. f.).

A middle sized deciduous tree with light grey bark. Leaves 2-pinnate, 0.3-1.2 m. long; main rhachis angular; leaflets 2-4 pairs with an odd one, 5-7.5 by 2.5-3.8 cm., elliptic-oblong, acute or acuminate, entire, glabrous when mature, reticulately veined, base acute or rounded, often unequal-sided; petiolules of lateral leaflets 0-6 mm. long. Flowers fragrant, appearing after the leaves in dense compound erect somewhat rigid pubescent panicles. Calyx 1.3 cm. long, pubescent outside; lobes 3-5, irregular, short, broad. Corolla 3.8-5 cm. long, white, tinged with yellow, glabrous on both sides, tube narrow within the calyx, then much swollen upwards; limb somewhat oblique, with subequal rounded crisped lobes. Filaments hairy at the base. Disk cupular, fleshy. Ovary elongate; ovules numerous, many-seriate in each cell; stigma 2-lamellate. Capsules 0.3-0.9 m. long, slightly curved, rough with numerous large irregular hard tubercles; valves woody, 2.5-3.8 cm. broad; dissepiment cylindric, bearing the seeds on shallow depressions. Seeds 3.2 cm. long, (including the membranous wing), thinly discoid, 6 mm. broad.

Distribution: Khandesh, Konkan, Deccan, S. M. Country, W. Ghats of Madras Presidency, N. Circars.

The oil from the wood is used in cutaneous affections.

Bombay: Bairsing, Kursingh—; *Canarese:* Ambalahude, Anetantuvaluka, Genasing, Ghanashrynga, Hude, Hulave, Huvvulave, Kanakakombu, Udi—; *Central Provinces:* Paral—; *English:* Padri Tree—; *Gond:* Dhotamara, Dhotte—; *Kurku:* Teto—; *Malayalam:* Edankorna, Patirevetamkaruna, Patiri, Vetamkaruna—; *Mandla:* Jaimangal, Sondarpadal—; *Marathi:* Bersinge, Kadashing, Kharsing—; *Tamil:* Alambal, Kadalatti, Malaiyudi, Mankombu, Padiri, Padirimilaidal, Pathiri, Savadi, Sirakkora, Vedanguruni—.

AMPHICOME Royle.

Perennial, glabrous, erect herbs; stems 0.3-0.6 m., sometimes thick and woody at the base. Leaves alternate, pinnate; leaflets toothed. Flowers pink; racemes erect or drooping. Calyx 8 mm. long. Corolla funnel-shaped; tube curved; lobes entire. Stamens 4, in unequal pairs; anthers cohering. Disk ring-shaped. Capsule slender, terete, 10-20 cm.; wing of seeds divided at each end into numerous, linear segments.—Species 2.—Himalaya.

The genus has febrifugal properties.

1. **Amphicome emodi** Lindl. Bot. Reg. (1838) t. 19 (in nota).—PLATE 710.

Leaves 12.5-20 cm.; leaflets 9-15, ovate, end one usually the longest, sometimes lobed. Calyx entire or obscurely toothed. Corolla 3.8-6.3 cm. long, 1.3-3.2 cm. wide at the mouth; tube tinged with yellow.

Distribution: Temperate Himalaya, 2,000—9,000 ft., from Kashmir to Nepal.

In Kashmir, the drug is prescribed for fever, and is considered a substitute for chirata.

Kashmir: Kaur—.

TECOMA Juss.

Shrubs or small trees, sometimes scandent, glabrous or somewhat pubescent. Leaves opposite, simple or simply pinnate, toothed. Racemes or panicles terminal. Flowers yellow. Calyx tubular-campanulate, 5-toothed. Corolla-tube elongated, straight or incurved,

inflated upwards, 5-lobed. Stamens 4, in 2 pairs. Disk annular. Ovary sessile. Capsule linear or elongated, straight or curved, compressed, loculicidally dehiscent. Seeds many, the wings thin, hyaline. —Species 90.—Tropical and warm temperate.

The genus exhibits astringent properties.

T. grandiflora Loisel. is used medicinally in China; *T. impetiginosa* Mart., *T. ipe* Mart., and *T. speciosa* DC. in Brazil.

1. **Tecoma stans** Juss. Gen. (1789) 139.

An erect, branched, sparingly pubescent or nearly glabrous shrub, 2-4 m. high. Leaves opposite, odd-pinnate, up to 20 cm. in length; leaflets 5 or 7, lanceolate to oblong-lanceolate, 6-13 cm. long, long and slenderly acuminate, base acute or acuminate, margins sharply serrate. Panicles terminal. Flowers racemosely arranged on the few branches. Calyx green, 5 mm. long, 5-toothed. Corolla yellow, 4-4.5 cm. long, tube inflated upward. Capsules linear, about 15 cm. long, 8 mm. wide, acuminate, compressed.

Distribution: Tropical America. Cultivated and almost run wild in parts of India.

The root is considered in the Satara District an effective remedy for snake and rat bites and for scorpion-sting. The root is ground with lemon juice or, if this cannot be had, with water, and applied to the affected part, while a tablespoonful is given internally.

The root is not an antidote to either snake or scorpion venom, and it is useless in the treatment of both snake-bite and scorpion-sting (Caius and Mhaskar).

Canarese: Koranekelar—; *French:* Bois de pissenlit—; *Satara:* Puttane—; *Tamil:* Nagasambagam, Sonnapatti, Sornapatti—; *Telugu:* Pachagotla—.

Crescentia Linn.

Small or medium sized glabrous trees, with alternate, simple or 3-foliolate leaves, solitary or fascicled at the nodes. Flowers on the trunk or axillary, solitary or fascicled. Calyx closed in bud, in flower broadly 2-5-lobed. Corolla-tube broad, bell-shaped, in front with a transverse fold, ventricose. Stamens 4, in 2 pairs. Ovary

sessile, 1-celled, placentæ 2. Fruit large, globose, indehiscent, the pericarp fleshy, becoming hardened. Seeds many, imbedded in the pulp, wingless.—Species 5.—Warm America.

C. cujete Linn. is used medicinally in Brazil and in the Transvaal.

1. **Crescentia cujete** Linn. Sp. Pl. (1753) 626.

A glabrous, much-branched tree 4-5 m. high. Leaves alternate, often fascicled at the nodes, oblanceolate, obtuse, or shortly acuminate, base gradually narrowed, subsessile, 5-17 cm. long, the upper surface glossy. Flowers axillary, solitary or in pairs, pedicelled, about 6 cm. long, with a somewhat fœtid odour. Calyx about 2 cm. long, split into 2 lobes. Corolla pale-greenish with faint purplish lines, inflated, slightly curved, horizontally plicate on the lower side, the lobes 5, equal, acuminate, toothed. Fruit globose, green or purplish, 15-18 cm. diam.

Distribution: Tropical America.

The fruit is aperient, cooling, febrifuge.

In Brazil, the pulp of the unripe fruit is sweetened with sugar and used as an antipyretic; the ripe fruit is made into a poultice and applied topically for headache.

In the Transvaal, the burnt and powdered pips are taken internally and applied locally in cases of snake-bite.

Afrikaans: Kalabas—; *Brazil:* Choyne, Choyte, Cuiete—; *Canarese:* Sokeburude—; *English:* West Indian Calabash Tree—; *Fanti:* Dweraba dua—; *French:* Arbre à calebasse, Arbre à couis, Calebassier—; *Gold Coast:* Tree Calabash—; *Sakalave:* Tsitopa—; *Tamil:* Tiruvottukkay—.

PEDALIACEAE.

Herbs, rarely undershrubs. Leaves opposite or upper alternate, entire, toothed, incised or pedatifid; stipules 0. Flowers irregular, hermaphrodite, solitary (rarely fascicled or racemose), usually axillary. Calyx gamosepalous, usually deeply 4-5-lobed. Corolla tubular-ventricose; limb 5-lobed, obscurely 2-lipped; lobes imbricate. Stamens 4, didynamous (rarely 2). Disk hypogynous, fleshy. Ovary 2- (rarely 1-) celled; ovules many or few, superposed; style filiform; stigma shortly 2-lobed. Fruit hard, indehiscent, or a 2- (rarely 3-4-) valved capsule. Seeds in the Indian species wingless; albumen 0.—Genera 14. Species 45.—Tropical and S. Africa, Madagascar, Indo-Malaya.

A. Flowers axillary. Stamens 4, didymous, perfect
   1. Ovules 2 in each cell. Fruit drupaceous, 4-spinous .... PEDALIUM.
   2. Ovules many in each cell. Fruit elongate, capsular .... SESAMUM.
B. Flowers in racemes. Stamens only 2 perfect
   Ovules many in each cell. Fruit drupaceous with dehiscent pericarp and crustaceous 2-clawed endocarp .... MARTYNIA.

The mucilaginous leaves are used as a demulcent drink and for the preparation of emollient cataplasms.

OFFICIAL:—*Sesamum indicum* Linn. (Germany, Great Britain, Holland, Hungary, Japan, Russia, Switzerland),—DC. (Sweden); *S. orientale* Linn. (Austria).

MARTYNIA Linn.

Coarse glandular herbs mostly dichasially branched with opposite broad leaves and drooping red flowers in short racemes terminal and from the forks of the branches. Calyx unequally 5-lobed, slit in front. Corolla tubular-campanulate zygomorphic with broad lobes. Stamens 5 of which the anterior 2 only perfect with long filaments and confluent anther-cells, the others reduced to staminodes of which the fifth is very rudimentary. Ovary 1-locular with 2 parietal placentæ which are divided towards the middle of the cell into two divaricate laminæ with many ovules 1-seriate on each lamina. Fruit obliquely ovoid, drupaceous with the pericarp finally dehiscent and

falling, leaving a crustaceous sculptured endocarp with 2 sharp curved apical spines and a central channel opening between the spines.—Species 1.—Mexico.

1. **Martynia annua** Linn. Sp. Pl. (1753) 618.—*M. diandra* Glox. Obs. Bot. (1785) 14, t. 1.

A handsome, stout, clammy-pubescent herb, 0.9-1.2 m. high. Leaves large, 15-23 cm. opposite, cordate, sinuately lobed and minutely dentate, often covered with a glutinous dew-like substance. Racemes 7.5-10 cm. long, terminal, erect; flowers drooping, 6-3 cm. long, pink and dark purple, foxglove-shaped, ill-smelling. Corolla glandular-hairy with very oblique mouth; lobes unequal, anterior transversely orbicular-oblong, 2.5 cm. wide, lateral semiorbicular, smaller, upper lip somewhat reflexed, 2-lobed, anterior surface of corolla within yellow-speckled, lobes with a deep purple blotch.

Distribution: A native of Mexico, now naturalized in India and springing up on rubbish-heaps and in waste places.

The fruit has a sharp taste; alexiteric; useful in inflammations.—The leaves are given in epilepsy; applied to tuberculous glands of the neck; the juice used as a gargle for sore throat (Ayurveda).

In scorpion-sting the fruit is rubbed down to a paste with water and applied to the part affected. The fruit, however, is useless in the antidotal and symptomatic treatment of scorpion-sting (Caius and Mhaskar).

Arabic: Kafemariyam—; *Behar:* Shernui—; *Bengal:* Baghnoki—; *Bombay:* Vinchu—; *Ceylon:* Nakatali—; *English:* Devil's Claw, Snake's Head, Tiger's Claw—; *Hasada:* Pusirama—; *Hindi:* Bichu, Hathajori—; *Marathi:* Vinchu—; *Madras:* Telkodukkukkay—; *Mundari:* Banarama, Banasarsar, Burisarsac—; *Naguri:* Gaimuci—; *North-Western Provinces:* Shernui—; *Persian:* Kafeasia—; *Punjab:* Bichu, Hathajori—; *Santal:* Baglucha—; *Telugu:* Garudamukku, Telukondichhettu—; *Urdu:* Hattajori—.

PEDALIUM Linn.

A glabrous annual. Leaves opposite or alternate, petiolate, rather broad, incised-dentate. Flowers axillary, solitary, yellow, suberect, shortly pedicellate; pedicels 2-glandular at the base. Calyx small, 5-partite. Corolla-tube slender below, enlarged above; limb subbilabiate; lobes 5, rounded, spreading, subequal. Stamens 4, didynamous, included; anther-cells ovate, parallel, distinct, pendulous. Ovary 2-celled; ovules 2 in each cell. Fruit hard, indehiscent, 2-celled; upper portion pyramidal-ovoid, obtuse, obscurely 4-gonous, each angle armed with a conical horizontal sharp spine. Seeds 2-1 in each cell, pendulous, oblong.—Species 1.—Tropical Africa, Ceylon, India.

1. **Pedalium murex** Linn. Syst. Nat. ed. X (1759) 1123; Wight Ic. t. 1615.—PLATE 711.

A much-branched herb 15-38 cm. high; stems and branches often slightly rough with scaly glands. Leaves opposite, pale glaucous-green, somewhat fleshy, 2.5-5 by 2-3.8 cm., broadly ovate-oblong, truncate or obtuse, coarsely crenate-serrate or sublobate, glabrous above, the lower side usually covered with minute scales, base acute; petioles 6-20 mm. long. Flowers axillary, solitary; pedicels 4 mm. long. Calyx small, scarcely 3 mm. long, minutely scaly outside, divided rather more than half way down; lobes 5, linear-triangular, acute. Corolla 2.5 cm. long, about 2 cm. across at the mouth, bright yellow; tube 2 cm. long, slender; lobes broad, rounded. Filaments glandular-hairy at the base. Fruit 1.3-2 cm. long, narrowed at the base, pyramidal-ovoid above the spines, bluntly 4-angled, with stout sharp conical horizontal spines from the angles.

Distribution: Kathiawar, Gujarat, Konkan, Deccan Peninsula, Ceylon.—Tropical Africa.

The properties and the synonymy are the same as those of *Tribulus terrestris* (Ayurveda).

The fresh leaves and stems, briskly agitated in cold water, speedily convert it into a *thick mucilage,* nearly of the consistence of the white of a raw egg, inodorous and tasteless. An infusion,

thus prepared, is a highly prized remedy amongst the people of Southern India, in *gonorrhœa* and *dysuria*.

The fruit is considered demulcent and diuretic, antispasmodic and aphrodisiac. The juice is used in aphthæ as a local application. The decoction is useful in irritation of the urinary organs; it is given as a remedy for spermatorrhœa, incontinence of urine, and impotence.

The juice of the fruit is an emmenagogue; it is employed in puerperal diseases, and to promote the lochial discharge. The leaves are used as a curry in splenic enlargements. The decoction of the root is antibilious (Thompson).

A decoction of the leaves was given to cases of gonorrhœa and the result was not satisfactory (Koman).

Arabic: Khasakekabir—; *Bengal:* Baraghokru—; *Burma:* Sulegi—; *Canarese:* Annegalugida—; *Deccan:* Baraghokru, Hattighokru—; *Goa:* Karonta—; *Gujerati:* Kadvaghokru, Mothaghokru, Mothangokharu, Mottoghokru, Ubbaghokru—; *Hindi:* Baragokhru, Faridbuti, Kadvagokhru—; *Malayalam:* Ananerinnil, Kakkamullu, Kathenerinmil, Katunerinjal—; *Marathi:* Gokhura, Hatticharatte, Karonathia, Mothegokharu—; *Punjab:* Gokrukalan—; *Persian:* Khasakekalan—; *Sanskrit:* Gokshura, Tittagokshura—; *Sinhalese:* Atineranchi—; *Tamil:* Anainerunji, Ananeringie, Perunerunji—; *Telugu:* Enugapallerumullu, Peddapaleru, Yenugapalleru—; *Uriya:* Gokshura—.

SESAMUM Linn.

Erect or prostrate herbs. Leaves opposite below, alternate above, entire, toothed, lobed or divided. Flowers axillary, solitary or few and fascicled, shortly pedicellate. Calyx small, 5-partite. Corolla 2-lipped; tube ventricose; lobes rounded, those of the upper lip usually rather smaller than the others. Stamens 4, didynamous, included; anthers sagittate, the cells subparallel, distinct. Ovary 2-celled, the cells each soon divided into 2 chambers by the intrusion of a false dissepiment from between the placentæ; ovules numerous, 1-seriate in

each chamber; style filiform; stigma 2-lobed. Capsule oblong or ovoid, usually 4-angled and 4-grooved, loculicidally 2-valved, 4-chambered. Seeds many, obliquely oblong, somewhat compressed, foveolate.—Species 15.—Tropical Africa and Asia.

The leaves are a mild laxative.

S. indicum Linn. is used medicinally in China, Indo China, the Philippine Islands, North America, Guiana, Madagascar, South Africa, Guinea; *S. calycinum* Welw. is used in Northern Rhodesia.

OFFICIAL:—The oil from the seeds of *S. indicum* Linn. (Germany, Great Britain, Holland, Hungary, Japan, Russia, Switzerland),—DC. (Sweden); *S. orientale* Linn. (Austria).

1. **Sesamum indicum** Linn. Sp. Pl. (1753) 634.—*S. orientale* Linn. l. c.—PLATE 712.

Erect 0.3-0.9 m. high, more or less fœtid and glandular, usually also pubescent. Leaves simple above, lanceolate or oblong or uppermost linear and alternate, lower opposite often lobed or pedatisect, intermediate usually ovate and gashed or toothed. Flowers purple or whitish with purple or yellow marks, suberect or drooping, 2.5-3.2 cm. long, pubescent. Sepals narrow-lanceolate, 5-6.4 mm., hairy. Capsule 2.5 cm. long, oblong, bluntly 4-gonous, erect, dehiscent from above downwards, but rarely to the base. Three varieties of seeds are known, black, white and red.

Distribution: Cultivated all over India, Baluchistan, Waziristan.—Probably a native of tropical Africa.

The seeds are acrid with a sharp bitter sweet taste; oleagenous, indigestible; tonic, cooling, galactagogue, diuretic, astringent to the bowels, aphrodisiac; promote the growth of hair; useful in diarrhœa, gouty joints, urinary concretions, eye diseases; applied to ulcers and piles; cause "kapha" and biliousness (Ayurveda).

The roots and seeds are aphrodisiac, tonic to the hair; enrich the blood; useful in sore throat, inflammations, scorpion-sting, snake-bite, strangury, bleeding piles, spleen trouble; cure menorrhagia; applied to gouty joints.—The oil from the seeds is sweet; fattening, strengthening; useful in dry cough, asthma, diseases of the lungs,

burning sensation while micturating, diseases of the ear and of the eye, scabies, smallpox, gouty joints, syphilitic ulcers, inflammations (Yunani).

Sesamum seeds are considered emollient, nourishing tonic, diuretic and lactagogue. They are said to be especially serviceable in piles, by regulating the bowels and removing constipation. Sesamum seeds ground to a paste with water are given with butter in bleeding piles. Sweetmeats made of the seeds are also beneficial in this disease. A poultice made of the seeds is applied to ulcers. Both the seeds and the oil are used as demulcents in dysentery and urinary diseases in combination with other medicines of their class.

In decoction the seed is said to be emmenagogue; the same preparation, sweetened with sugar, is prescribed in cough; a compound decoction with linseed is used as an aphrodisiac; a plaster made of the ground seeds is applied to burns, scalds, etc.; a lotion made from the leaves is used as a hair-wash, and is supposed to promote the growth of the hair and make it black; a decoction of the root is said to have the same properties, a powder made from the roasted and decorticated seeds is called *Rahisee* in Arabic and *Arwah-i-kunjad* in Persian; it is used as an emollient both externally and internally.

An infusion of the leaves is much used in the Southern States of North America in all affections requiring demulcents. One or two full-sized fresh leaves, infusion or agitated in half a pint of cold water, will soon render it sufficiently viscid for this purpose. If the dried leaves be used, hot water should be substituted for the cold. The leaves also serve for the preparation of emollient poultices.

In Ceylon, the oil is used for cooling the body. The seeds, pounded with jaggery, are taken to purify the blood.

Every part of the plant is used as a diuretic in Cambodia. The oil from the seeds is used internally as an emmenagogue in small doses and as an abortifacient in larger ones; it is also rubbed over the abdomen to procure abortion, and over the head to cure migraine and vertigo.

In Guiana, the roots and flowers are considered emollient, the leaves mucilaginous, and the seeds diuretic; the oil is applied to burns.

In Madagascar, every part of the plant is considered emollient and laxative. In Guinea, an infusion of the leaves is given as a remedy for diseases of the respiratory tract.

In South Africa, natives use the seed as an aphrodisiac. The Sutos drink a decoction of the leaf for malaria and chew the leaf instead of tobacco.

Sushruta prescribes the leaves in the treatment of snake-bite and scorpion-sting; but the leaves are not an antidote to either snake-venom (Mhaskar and Caius) or scorpion-venom (Caius and Mhaskar).

Afghanistan: Kunjit, Til—; *Annam:* Chi ma—; *Arabic:* Djyld-jylan, Duhn, Samsam, Simsim—; *Bengal:* Bhadutil, Kalatil, Kattil, Khaslatil, Krishnatil, Raktatil, Rasi, Sankitil, Sumsum, Tel, Til, Tilmi—; *Bombay:* Ashadital, Bariktil, Kalakatwa, Krishnatil, Purbia, Tal, Til—; *Brazil:* Gergelim, Jerxelim—; *Burma:* Hnan—; *Caguyan:* Langa—; *Cambodia:* Longo—; *Canarese:* Achchellu, Ellu, Wollellu, Yallu—; *Catalan:* Sesamo—; *Central Provinces:* Til, Tili—; *Ceylon:* Ella—; *Chinese:* Hu Ma—; *Deccan:* Bariktel, Til—; *Egypt:* Semsem—; *English:* Gingelly, Sesame—; *French:* Benne, Jugeoline, Jugioline, Sesame—; *French Guiana:* Ouange, Sesame—; *Fulah:* Bene lubungny—; *German:* Sesam—; *Gujerati:* Mithutel, Tal, Tel, Til—; *Hausa:* Lidi, Nome, Ridi—; *Hindi:* Bariktel, Gingli, Krishnatel, Mithatel, Til, Tilkatel, Tir—; *Kolami:* Til—; *Konkani:* Pilli, Tili, Till—; *Kumaon:* Bhunguru, Til—; *Las Bela:* Tirr—; *Madagascar:* Voahazo—; *Malay:* Bijan, Lenga—; *Malayalam:* Chitelu, Chitrallu, Ellu, Karellu—; *Malinke:* Bene—; *Marathi:* Til, Tila, Zilechatil—; *Nepal:* Til—; *North-Western Provinces:* Gingily, Til, Tili—; *Orissa:* Khasa, Rasi—; *Pampangan:* Langis—; *Persian:* Kunjad, Kunjed, Roghen—; *Philippines:* Ajonjoli, Lana, Lingo—; *Portuguese:* Gergelim—; *Punjab:* Kunjad, Til, Tili—; *Sanskrit:* Homadhanya, Jatila, Papaghna, Pavitra, Pitratarpana, Puraphala, Putadhanya, Snehaphala, Tailaphala, Tila, Vanodbhava—; *Santal:* Kattilmin, Tilmin—; *Sind:* Thirr, Til—; *Sinhalese:* Talla, Tallaatta, Teltala, Tunpattala, Waltala—; *Soussou:* Diguilliniy fore—; *South Africa:* Gingilli, Sem-Sem, Sesame, Thunderbolt Flower—; *Spanish:* Sesamo—; *Sumatra:* Benjam—; *Suto:* Molekelela—;

Tagalog: Langnga, Languis, Lengnga, Linga—; *Tamil:* Ellu, Nuvvulu, Yelluchedi—; *Telugu:* Nuvvu, Nuvvulu, Pollanuvvulu—; *United States (Southern):* Benne—; *Urdu:* Til—; *Visayan:* Longa—.

ACANTHACEAE.

Herbs or shrubs, rarely trees. Leaves opposite, usually entire, stipules 0. Flowers hermaphrodite, usually irregular, in cymes, racemes, or spikes (rarely solitary); bracts large or small, sometimes 0; bracteoles usually 2, sometimes more under the individual flowers, free or connate into an epicalyx. Calyx 5-(rarely 4-) partite (in Thunbergia small, often multifid). Corolla 2-lipped or subequally 5-lobed; lobes imbricate or twisted in bud. Stamens 4 or 2, inserted on the corolla-tube; anthers 2- or 1- celled, the cells sometimes remote. Disk often conspicuous. Ovary superior, 2-celled; ovules 1 or more in each cell, 1- or 2- seriate, anatropous; style simple, filiform, or thickened below; stigma usually 2-lobed, the lobes sometimes unequal. Fruit a loculicidal capsule, the valves often elastically recurved, the septum splitting, the seeds borne on each half. Seeds usually hard, attached (except in a few genera) to recurved subacute supports (retinacula), ovoid or compressed, smooth or rugose, rarely hispid; albumen 0 or (rarely) scanty.—Genera 240. Species 2,000.—Especially tropics, but also Mediterranean, U. S. and Australia.

A. Corolla-lobes twisted to the left in bud. Seeds on retinacula. Sepals 5 or 4 with 1 larger. Anthers usually 2-celled. Style bifid, one lobe often suppressed
- I. Ovules 3-12 in each cell. Capsule normally 6- or more- seeded
  - a. Corolla distinctly 2-lipped
    - 1. Lower leaves often toothed or pinnatifid. Flowers axillary, sessile. Retinacula scarcely hooked .... CARDANTHERA.
    - 2. Leaves entire. Flowers axillary subsessile. Retinacula hooked .... ASTERACANTHA.
  - b. Corolla subequally 5-lobed
    - Bracteoles large. Stamens muticous. Capsule clavate, base of capsule solid .... RUELLIA.

II. Ovules 2 in each cell. Capsule 4- or fewer- seeded
- a. Corolla subequally 5-lobed. Stamens 4 or 2. Anthers muticous .... STROBILANTHES.
- b. Corolla-tube very long, linear; lobes subequal. Stamens 2 .... DAEDALACANTHUS.

B. Corolla-tube short, upper lip obsolete, lower 3-lobed. Ovules 2 in each cell
- I. Anterior filaments with an excurrent process .... BLEPHARIS.
- II. Anterior filaments without an excurrent process .... ACANTHUS.

C. Corolla-lobes imbricate in bud. Anthers 2-1-celled. Cells often spurred at the base, one frequently placed much above the other. Style shortly equally bifid or subentire

I. Ovules 3-10 in each cell. Capsule normally 6- or more- seeded
- a. Flowers panicled or thyrsoid .... ANDROGRAPHIS.
- b Flowers axillary, clustered with cladodes among them .... HAPLANTHUS.
- c. Corolla-tube very slender, limb small .... GYMNOSTACHYUM.
- d. Corolla cylindric, curved, not ventricose nor deeply 2-lipped .... PHLOGACANTHUS.

II. Ovules 2-1 in each cell. Corolla-lobes 5, subequal. Stamens 4 of which 2 are small or obsolete
- a. Sepals 4, 2 outer opposite larger. Anthers 2-celled .... BARLERIA.
- b. Calyx 2-lipped, 5-lobed. Anthers 2-celled .... NEURACANTHUS.
- c. Outer calyx-lobes much the larger. Anthers 1-celled .... CROSSANDRA.

III. Ovules 2 in each cell. Corolla-lobes 5, subequal. Sepals 5, small, subequal. Stamens 4 or 2. Anther-cells 2, subequal, parallel, muticous
- Corolla-tube long, narrow or subventricose. Stamens 4 ... ASYSTASIA.

IV. Ovules 2 in each cell. Corolla distinctly 2-lipped
- a. Calyx deeply 5- or 4- lobed .... LEPIDAGATHIS.
- b. Bracts in one-sided spikes .... RUNGIA.
- c. Bracts clustered, shortly peduncled .... DICLIPTERA.
- d. Anther-cells muticous. Bracts in opposite pairs, valvate .... PERISTROPHE.
- e. Anther-cells minutely spurred at the base .... JUSTICIA.
- f. Anther-cells apiculate, scarcely spurred at base .... ADHATODA.
- g. Anthers muticous. Flowers clustered. Corolla long .... RHINACANTHUS.
- h. Bracts large, imbricate. Corolla-tube narrow, long ...... ECBOLIUM.
- i. Bracts small. Corolla-tube elongate .... GRAPTOPHYLLUM.

Most of the members of this Order have mucilaginous properties and are more or less bitter; a few are acrid and stimulant.

CARDANTHERA Ham. ex Voigt.

Aromatic often viscid herbs. Leaves opposite, the upper toothed (rarely entire), the lower often pinnatifid or, if submarged, pectinate. Flowers in spikes or whorls or 1-3 together in opposite axils; bracts

or bracteoles often suppressed. Calyx divided almost to the base; sepals 5, narrow, often unequal. Corolla 2-lipped; tube nearly straight, shorter than the calyx; limb long, the lobes twisted to the left; throat with a transversely plaited palate. Stamens 4, didynamous; anthers of the upper pair often smaller, the cells parallel. Ovary narrow, 2-celled; ovules many. Capsule sessile, narrow, seed-bearing throughout. Seeds 40-100, small, ovoid, somewhat compressed, glandular-puberulous or glabrous; retinacula minute, conical, soft, straight.—Species 10.—Palæotropics.

The genus is therapeutically inert.

1. **Cardanthera uliginosa** Benth. in Benth. and Hook f. Gen. Pl. II, 1074.—PLATE 713.

Annual, 30-45 cm., erect or decumbent, branching from the base; stem pubescent upwards. Leaves 2.5 by 0.8 cm., glabrous or subpubescent, subsessile oblong or subovate entire or crenate, bracts round ovate. Spikes 2.5-7.5 cm., scarcely interrupted at the base even in fruit; bracts 6 mm., from elliptic to cordate, glabrous or puberulous; bracteoles 5 mm., obovate or elliptic. Sepals 5 mm., linear, pubescent. Corolla 8 mm., puberulous. Anthers of the posterior stamens half as large as of the anterior. Capsule 5 mm., minutely pilose upwards.

Distribution: N. Circars, Carnatic, Anamalais, at 800 ft., Ceylon, Sikkim Terai.

The juice of its leaves mixed with salt, is used on the Malabar Coast as a blood purifier (Balfour).

ASTERACANTHA Nees.

A stout herb growing in wet places; stems numerous, fasciculate, spinous at the nodes. Leaves narrow, lanceolate, in whorls of 6, the 2 outer leaves of the whorl the larger. Flowers in sessile axillary verticels surrounded by rigid spines; bracts leaf-like; bracteoles linear-lanceolate. Calyx 4-partite to the base or nearly so, the upper sepal the broader. Corolla deeply bilabiate, the upper lip 2-lobed, the lower 3-lobed and with 2 callosities on the palate. Stamens 4, didynamous; anthers 2-celled, equal, the cells parallel, glabrous,

muticous. Ovary 2-celled; ovules 4 in each cell; style pubescent; stigma simple, acuminate. Capsule 2-celled, compressed, 4-8-seeded at the base. Seeds hygroscopically white-hairy, supported on hard retinacula.—Species 1.—Palæotropics.

1. **Asteracantha longifolia** Ness in Wall. Pl. As. Rar. III (1832) 90.—*Hygrophila spinosa* T. Anders. in Thw. Enum. (1860) 225.—PLATE 714 (under *Hygrophila spinosa* T. Anders).

A stout herb with numerous fasciculate usually unbranched subquadrangular erect stems 0.6-1.5 m. high, thickened at the nodes, more or less hispid with long hairs, especially below each node. Leaves sparsely hispid on both sides, tapering at the base, sessile (or at least without clearly defined petioles), in verticels of 6 at a node, the 2 outer leaves of the whorl large, reaching 18 by 1.3-3.2 cm., oblong-lanceolate or oblanceolate, the 4 inner leaves reaching about 3.8 cm. long, each of the 6 leaves with nearly straight sharp yellow spine, 2.5-4.5 cm. long, in its axil. Flowers in a whorl of 8 (in 4 pairs) at each node; bracts about 2.5 cm. long, like the leaves, lanceolate, hairy and ciliate; bracteoles 2 cm. long, linear-lanceolate, with hyaline margins in the lower part, hairy and ciliate with long white hairs. Calyx 4-partite; upper sepal 1.6-2 cm. long, broader than the other 3, which are 1.3 cm. long, all linear-lanceolate, coarsely hairy on the back, and with hyaline ciliate margins. Corolla purple-blue, reaching 3.2 cm. long, widely 2-lipped; tube 1.6 cm. long, abruptly swollen at the top; lips subequal, 1.6 cm. long, the upper lip 2-fid with oblong truncate lobes, the lower lip with 2 entire crest-like longitudinal folds or callosities on the palate, deeply 3-lobed, the lobes oblong or slightly obovate, rounded or truncate. Filaments quite glabrous, one short and one long filament of each pair united at the base. Style slightly pubescent, filiform. Capsules 8 mm. long, linear-oblong, pointed, 4-8-seeded.

Distribution: Throughout India, Ceylon.—Tropical and S. Africa.

The leaves are sweet, sour, bitter, tasty; oleagenous, tonic, aphrodisiac, hypnotic; useful in diarrhœas and dysenteries, thirst, urinary calculi, urinary discharges, inflammations, biliousness, diseases of the eye, pains, ascites and abdominal troubles, anæmias,

constipation, anuria.—The seeds are cooling, tasty, acrid, bitter; aphrodisiac, tonic; sedative to the gravid uterus; constipating; useful in diseases of the blood and biliousness (Ayurveda).

The leaves are good for cough; applied for gleet, and in lumbago and pains in the joints.—The seeds are tasteless, fattening, aphrodisiac, tonic; improve the blood (Yunani).

The seeds are given for gonorrhœa, and with milk sugar in spermatorrhœa.

When placed in the mouth they immediately become coated with a large quantity of extremely tenacious mucilage, which adheres to the tongue and palate and is of rather agreeable flavour.

In the Gold Coast, it is sometimes boiled in water, which is then used in bathing to cure fever.

A decoction of the root was used in 1-ounce doses as a diuretic in dropsy of chronic Bright's disease, and found to be a fair diuretic (Koman).

Behar: Kantakulika, Talmakhana—; *Bengal:* Kantakalika, Kulaka, Kuliakhara, Shulamardan—; *Bombay:* Kolsunda, Talimkhana—; *Canarese:* Kalavankabija—; *Ewe:* Eyitror—; *Fanti:* Atwain—; *Gujerati:* Ekharo, Gokhru—; *Hausa:* Dayingiwa, Saregwiwa, Lagargiwa—; *Hindi:* Gokhulakanta, Gokshura, Kailaya, Talmakhana—; *Konkani:* Kolista—; *Malayalam:* Bahelshulli, Vayalchulli—; *Marathi:* Talimakhana, Vikhara—; *Sanskrit:* Atichhatra, Bhikshu, Chhatraka, Ikshugandha, Ikshura, Ikshuvalika, Kakekshu, Kandekshu, Kokilaksha, Kokilanayana, Kshura, Kshuraka, Kulahaka, Pichhila, Pikekshana, Shrigalaghanti, Shrigali, Shrinkhali, Shuklapushpa, Shuraka, Trikshura, Vajra, Vajrakantaka, Vajrasthi, Virataru—; *Santali:* Gokhulajanum—; *Sinhalese:* Katreiriki—; *Tamil:* Neremulli, Nirmalli—; *Telugu:* Neerugubbi, Nirguviveru—; *Urdu:* Talimkhana—; *Utkal:* Kuilirakha, Makheruna—.

Ruellia Plum. ex Linn.

Herbs or undershrubs. Leaves opposite, subentire. Flowers sessile or subsessile, solitary or in clusters or racemes; bracts 0; bracteoles large, usually exceeding the calyx. Calyx 5-partite or

5-fid; segments subequal, narrow, acute. Corolla oblique; tube ventricose; lobes subequal, rounded, twisted to the left in bud, spreading in flower. Stamens 4, didynamous; filaments glabrous or sometimes hairy at the base; anthers subequal, 2-celled, the cells oblong, muticous, glabrous; pollen globose, reticulate or honeycombed. Ovary 2-celled; ovules 3-10 in each cell; style linear, hairy; stigma with one oblong-linear branch, the other suppressed or nearly so. Capsule clavate, cylindric, seed-bearing upwards, solid at the base below. Seeds large, thin, discoid, margined, hygroscopically hairy; retinacula large, strong, hooked.—Species 210.—Tropics and subtropics.

1. Leaves small, ovate, sparsely hairy or nearly glabrous .... 1. *R. prostrata.*
2. Leaves elliptic-hairy, not acuminate .... 2. *R. suffruticosa.*

Root emetic; leaves sudorific and febrifuge.

R. tuberosa Linn. is used medicinally in the West Indies, Central America, Guiana and Peru.

1. **Ruellia prostrata** Poir. Encycl. Méthod. VI (1804) 349, var. *dejecta* C. B. Clarke in Hook. f. Fl. Brit. Ind. IV (1884) 412.—PLATE 715B.

Stems 15-45 cm. long, straggling or climbing among bushes, much-branched, terete with long internodes, thickened and purple at the nodes, more or less pubescent. Leaves 2-7.5 by 1.3-4.5 cm., ovate or elliptic, acute, sparsely hairy, margins entire, base acute; petioles 6-20 mm. long. Flowers nearly sessile, axillary, solitary or few together; bracteoles like the leaves but smaller, 8-22 mm. long (including the stalk). Calyx 8 mm. long, divided about $3/4$ the way down; segments linear-subulate, very acute, hairy. Corolla pale mauve-violet, 3.2 cm. long, pubescent outside; tube narrowly cylindric below, infundibuliform above; lobes 6-10 mm. long, obovate-oblong, rounded at the apex. Filaments glabrous. Ovary pubescent; style pubescent. Capsules 2 cm. long, slightly pubescent, clavate, pointed. Seeds 16-20, orbicular, 3 mm. diam., almost glabrous on the faces, with a dense fringe of hygroscopic hairs on the margin.

Distribution: Throughout India, Ceylon.—E. Africa.

The juice of the leaves, boiled with a little salt, is supposed on the Malabar Coast to correct a depraved state of the humors (Rheede).

They are sometimes given with liquid copal as a remedy for gonorrhœa (Ainslie).

Gujerati: Kalighavani, Kalighramanthokali—; *Malayalam:* Upudali—; *Sinhalese:* Nilpuruk—.

2. **Ruellia suffruticosa** Roxb. Fl. Ind. III (1832) 53.—PLATE 715A.

An erect pubescent undershrub, 0.3-0.6 m. high. Roots stout, often with fusiform swellings. Stems herbaceous, annually produced from a short creeping woody rhizome. Leaves petioled, lanceolate elliptic or oblanceolate, the lower ones usually smaller and often suborbicular, obtuse or subacute, entire, villous with white hairs on both surfaces especially on the nerves and veins beneath, margins ciliate. Flowers solitary, terminal, subsessile; bracteoles resembling the leaves but smaller and narrower, 2 cm. long, stalked. Calyx-segments 6 mm. long, linear, puberulous or nearly glabrous. Corolla white, 3.8-5 cm. long, tube slender, limb subregular. Capsule 3.8 cm. long, oblong, glabrous, often tinged with purple. Seeds few.

Distribution: Upper Gangetic Plain, N. and W. Bengal, Chota Nagpur, Upper Burma.

The root is used medicinally by the Santals in gonorrhœa, syphilis and renal affections generally (Campbell).

If the root, dried and ground, be taken in the quantity of 2 oz. by a pregnant woman, it is said to cause abortion. The same root dried and ground is also used as a medicine for sore eyes. For this purpose it is macerated in water which is then strained and used as an eye-wash (*Encyclopœdia mundarica*).

Mundari: Carpandu—; *Santal:* Chaulia—.

DAEDALACANTHUS T. Anders.

Perennial herbs or shrubs. Leaves opposite, petiolate, entire or obscurely toothed, lineolate from imbedded cystoliths. Flowers in linear distant or close spikes or heads; bracts usually large; bracteoles linear-lanceolate, shorter than the calyx. Calyx 5-lobed; lobes

narrow, often scarious. Corolla slender; tube long, narrow, widened at the mouth or in some species from the middle; lobes obovate, twisted to the left in bud, spreading in flower. Stamens 2, glabrous; anthers narrowly oblong, 2-celled, muticous, exserted or subincluded. Ovary glabrous, 2-celled; ovules 2 in each cell; style long, sparsely pubescent or glabrous; stigma simple, linear. Capsule clavate, with solid cylindric base. Seeds normally 4, compressed, discoid, hygroscopically hairy; retinacula acute.—Species 14.—Indo-Malayan.

The genus is therapeutically inert.

1. **Daedalacanthus roseus** T. Anders. in Journ. Linn. Soc. IX (1867) 487.—PLATE 716.

Stems 0.6-1.8 m. high. Leaves 12.5-20 by 3.8-7.5 cm., oblong-lanceolate, acuminate, lineolate on both sides, entire or obscurely crenulate, base tapering, often decurrent into the petiole; main nerves about 10 pairs, prominent below; petioles 1.3-3.2 cm. long. Inflorescence with a strong sickly odour; flowers in linear subinterrupted lax axillary and terminal spikes often 15 cm. long, solitary or occasionally 2 or 3 together forming a terminal panicle; peduncles quadrangular; bracts 1.6 cm. long, obovate, with a reflexed mucro, white with very prominent raised green nerves, densely hairy on the midrib and ciliate on the margins with long hairs; bracteoles as long as or slightly longer than the calyx, narrowly linear, acute, densely clothed on the back and ciliate with long white hairs. Calyx 5 mm. long, scarious, white-pubescent, divided about half way down; lobes lanceolate, very acute, with a strong midnerve from base of calyx to the apex of each lobe. Corolla blue or rose fading to purple or red, 2.5-3.8 cm. long, slightly pubescent outside; tube slender, slightly enlarged and funnel-shaped to about 3 mm. below the limb; lobes 1 cm. long, oblong-obovate, rounded or truncate at the apex. Stamens exserted beyond the corolla-tube; filaments glabrous. Ovary glabrous; style glabrous or nearly so. Capsules 1.3 cm. long, clavate, pointed, glabrous. Seeds 3-4 mm. diam., hygroscopically hairy, very densely so on the margin.

Distribution: Konkan, Deccan, S. M. Country. N. and S. Kanara.

The root boiled in milk is a popular remedy for leucorrhœa.

Hindi: Gulsham—; *Marathi:* Dasamuli, Gulsham—; *Porebunder:* Dashamuli—; *Tamil:* Nilamulli—.

STROBILANTHES Blume.

Shrubs or herbs. Leaves opposite, often unequal, toothed or subentire, often lineolate with cystoliths. Flowers capitate or in strobilate or interrupted spikes, or paniculate, sessile or sometimes pedicellate; bracts and bracteoles large or small or 0, persistent or caducous. Calyx (in Bombay species) deeply and subequally 5-divided. Corolla straight or curved; tube usually ventricose above; lobes 5, ovate or rotund, subequal, twisted to the left in bud. Stamens (in Bombay species except *S. reticulatus*) 4, didynamous; anthers oblong, 2-celled, muticous. Disk small, or elongate as a stalk to the ovary. Ovary 2-celled; ovules 2 in each cell; style linear; stigma of one long linear branch, the other branch obsolete. Capsule 4- or 2- seeded. Seeds much compressed, glabrous or hairy; retinacula strong, curved; placentæ in a few species separating elastically from the base, carrying the seeds with them.—Species 200. —Tropical Asia, Madagascar.

A. Seeds not hairy .... 3. *S. ciliatus.*
B. Seeds hairy
  1. Leaves acuminate at both ends .... 1. *S. callosus.*
  2. Leaves auriculate .... 2. *S. auriculatus.*

The genus has no therapeutical value.

1. **Strobilanthes callosus** Nees in Wall. Pl. As. Rar. III (1832) 85.—*S. Grahamianus* Wight Ic. t. 1520.

A shrub 1.8-6 m. high; stems rigid, rough and warted, glabrate. Leaves 10-23 by 3.8-7.5 cm., one of each pair often smaller than the opposite one, elliptic-lanceolate, acute or acuminate, the margins crenate and ciliate (the crenatures sometimes with a blunt tooth), strongly lineolate on the upper surface with cystoliths (which in dried specimens are usually stellately arranged with a stiff short bristle above the centre of each cluster), dark green above, paler and more or less hairy on the nerves beneath, base tapering wing-like into the

petiole; main nerves 10-14 pairs, slender, prominent; petioles variable in length, sometimes reaching (in the large leaves) 7.5 cm. long. Flowers axillary, in simple or branched ovoid, pedunculate, subtetragonal spikes with rounded edges, 2.5-9 cm. long; peduncles often with one or two pairs of orbicular sessile bracts below the spike; bracts 1.3-2 cm. long, often as broad as long, broadly elliptic or obovate, rounded at the apex, concave, glabrous, covered with a viscous secretion with a balsamic but not agreeable odour, green with a pink tinge; bracteoles 0. Disk bright orange. Calyx 1.3 cm. long in flower, much enlarged in fruit, divided nearly to the base; segments leathery, elliptic-lanceolate, 4-5 mm. broad, obtuse, slightly penicillate at the apex, softly pubescent, nerved. Corolla 3.8 cm. long or more, with a white tube and purple limb, glabrous outside, with yellow hairs in the mouth inside; cylindric base of the tube narrow, shorter than the ventricose portion; lobes 1.3 cm. long, rounded, much crumpled in aestivation. Filaments of the longer stamens bearded. Capsules 2 by 0.6 cm., obovoid, acute, apiculate, narrow at the base, 2-seeded. Seeds 1.3 by 1 cm., broadly ovate, acute, densely clothed (except the oblong nucleus) with white appressed hairs.

Distribution: Central India, Konkan, Deccan, N. Kanara, W. Ghats of Bombay Presidency.

The bark is used as an emollient. The flowers are considered vulnerary.

Bombay: Karvi—; *Junagoda:* Girnaripandadi—; *Marathi:* Karvi—; *Pachmarhi:* Maruadana—.

2. **Strobilanthes auriculatus** Nees in Wall. Pl. As. Rar. III (1832) 86, t. 195.—Plate 718.

A shrub, 0.6-1.8 m. high; branches spreading and often zigzag, 4-angled, glabrous or more or less hairy at their extremities. Leaves sessile elliptic-lanceolate or ovate-oblong, those of the same pair often very unequal 7.5-25 cm. long, acuminate, serrulate, pubescent on both surfaces, base auricled. Spikes 7.5-12.5 cm. long, mostly terminal and solitary, linear-oblong, densely velvety-pubescent; bracts 6-8 mm.

long and usually broader, obovate, obtuse, softly tomentose, glandular-pubescent, apex often recurved in fruit, bracteoles none. Calyx-segments 6-8 mm. long, linear, obtuse, closely velvety-hairy. Corolla 2.5 cm. long, curved, pale blue, slightly hairy, lower cylindric portion 8 mm. long, limb somewhat 2-lipped. Capsule 8 mm. long, 4-seeded, glabrous.

Distribution: Upper Gangetic Plain, Central India up to 4,000 ft., Chota Nagpur and Central Provinces.—Ava.

The pounded leaves are rubbed on the body during the cold stage of intermittent fever.

Bombay: Kara, Karvi—; *Mundari:* Hutiddaru, Maranghutid—; *Santali:* Gadakalha, Harnapakor—; *Tamil:* Kurinji, Sinnagurinji—;

3. **Strobilanthes ciliatus** Nees in Wall. Pl. As. Rar. III (1832) 85.—PLATE 717.

A small shrub; stems and branches terete or subquadrangular, often fimbriate at the nodes. Leaves 10-18 by 2.5-5 cm., lanceolate, acuminate, lineolate (densely so above), glabrous or nearly so, serrate, base attenuated into the petiole; main nerves 6-7 pairs; petioles 1.3-3.8 cm. long, sometimes obscure. Flowers in axillary slender glabrous spikes 2.5-7.5 cm. long; peduncles long, slender, glabrous, jointed and bracteate below the middle and there deflexed; bracts 6 mm. long, ovate, subacute, glabrous, lineolate, the margins often obscurely toothed; bracteoles 4 mm. long, shorter than the calyx, linear, subobtuse, mucronulate, lineolate, glabrous. Calyx 6 mm. long, glabrous or nearly so; tube about 1.25 mm. long; segments subequal, linear, subobtuse. Corolla white, 13-16 mm. long; tube narrow in the lower part, campanulately swollen in the upper half; lobes 3 mm. long, oblong, rounded at the apex, spotted with lilac at the base. Stamens 4, exserted; filaments of the longer stamens bearded; anthers purple. Ovary glabrous; style glabrous. Capsules not seen.

Distribution: Kanara to Travancore.

The bark is used as an emollient, the flower as a vulnerary.

Tamil: Kurinji, Sinnangurinji—.

BLEPHARIS Juss.

Undershrubs often spinous or with spinous-toothed leaves. Leaves opposite or 4-nately whorled. Flowers in terminal spikes or on suppressed lateral branches, strobilate, tetrastichous or capitate and few-flowered, or axillary and 1-flowered, bracteolate. Calyx 4-partite nearly to the base; segments unequal, in opposite pairs, one of the larger pairs emarginate or 2-lobed, the 2 inner segments much shorter and narrower. Corolla 2-lipped; tube rigid; upper lip subobsolete; lower lip spreading, nearly flat, obovate or oblong, with 3-5 rounded lobes, purple, blue or white. Stamens 4, didynamous; filaments thick, rigid, those of the lower stamens produced beyond the attachment of the anthers; anthers with 1 large cell with densely bearded margins, the other cell small or obsolete. Disk annular. Ovary 2-celled, ovules 2 in each cell; style linear; stigma shortly 2-fid. Capsule oblong, scarcely contracted at the base, 2-4-seeded. Seeds compressed, orbicular, echinate, supported on rigid retinacula. —Species 80.—Palæotropics, Mediterranean, S. Africa.

1. Capsule 5 cm. long or rather more .... 1. *B. edulis.*
2. Capsule 8 by 5 mm. .... 2. *B. sindica.*

B. capensis Pers., *B. espinosa* Phillips, *B. procumbens* Pers., *B. stainbankiae* C. B. Cl. are used medicinally in South Africa.

1. **Blepharis edulis** Pers. Syn. II (1807) 180.—PLATE 719B.

Grey-pubescent or nearly glabrate. Stem short, rigid, branched. Leaves in fours at the sterile nodes; upper pair 5 by 1 cm., oblong or narrow-elliptic, sessile, spinous-margined; lower pair smaller but similar. Inflorescences strobilate, up to 9 cm. long, sometimes short; bracts 2-2.5 cm. long, ovate, acuminate, recurved, spinous, puberulous, more or less hairy on the nerves without when young; bracteoles linear, 1-1.5 cm. long. Posticous calyx-segment 1-1.5 cm. long, broadly ovate, very hairy; 2 inmost calyx-segments 5-8 mm. long. Corolla 2 cm. long or rather more, blue. Capsule 5 cm. long or rather more, 2-seeded.

Distribution: Baluchistan.—Persia, Arabia, Egypt, Nubia, Abyssinia.

The leaves are acrid with a flavour; cooling, astringent to the bowels, aphrodisiac, appetiser, alterative, alexteric; useful in tridosha, fevers, urinary discharges, leucoderma, mental derangements, applied to wounds and ulcers.—The seeds cure strangury (Ayurveda).

The root is diuretic; regulates menstruation; useful in urinary discharges.—The leaves are maturant, tonic, aphrodisiac, purgative; stop nasal hæmorrhage; given in hydrophobia, asthma, cough, inflammation of the throat, ascites, liver and spleen troubles.—The seeds are tasteless; vulnerary; useful in urinary discharges, inflammations; good for diseases of the blood, chest, lungs, and liver (Yunani).

The seeds are considered to be attenuant, resolvent, diuretic, aphrodisiac, expectorant, and deobstruent.

In Baluchistan, the seeds are a medicine for sore eyes (Hughes-Buller).

Arabic: Kariz, Schokeddabb—; *Bengal:* Shushani—; *Bombay:* Uttangan—; *Gujerati:* Khadakatira, Otigana—; *Hindi:* Chaupatia, Guthava, Shiriari, Uttanjan—; *Kharan:* Balbajawar—; *Marathi:* Karadu—; *Persian:* Anjara—; *Punjab:* Uttangan—; *Quetta:* Balbajawar—; *Sanskrit:* Babhru, Chachu, Grahaka, Kukkuta, Kuranta, Kurkuta, Medhakrita, Parnaka, Sachidala, Shikhi, Shitichara, Shitivara, Shrivaraka, Shvetavara, Sitivara, Suchipatra, Suchyavha, Suchyavhaya, Sunishanna, Sunishannaka, Sutapatra, Svastika, Vitunna—; *Urdu:* Uttanjan—; *Turki:* Kajit—.

2. **Blepharis sindica** T. Anders. in Journ. Linn. Soc. IX (1867) 500; *Acanthodium grossum* Wight Ic. tt. 1535-36.

A small dichotomously branched shrub; stem usually very short, sometimes almost 0; branches ash-coloured, slender, subterete, clothed with very short hairs Leaves sessile in a whorl of 4, unequal, 2.5-6.3 cm. by 1.5-4 mm., linear, acute, sometimes with a few small spinous teeth near the base, finely apiculate, rough with short stiff hairs, margins recurved, midrib strong beneath. Flowers in strobilate subsessile hairy spikes 2.5-7.5 cm. long, in the forks of the branches, solitary or few or many together on the top of a very short stout woody peduncle, usually numerous in the lowest fork, solitary in the upper; bracts quadrifarious, 1.3-2.5 by 0.8-1.3 cm., the lowest the

smallest, hairy on both sides, ovate, suddenly acuminate, spinous-pointed, 5-nerved, more or less recurved above, the upper part of each armed with long, distant, usually recurved sharp slender spines; bracteoles 2 beneath the calyx, rather less than 1.3 cm. long, lanceolate, acute, hairy and ciliate, reticulately veined and with a strong midnerve. Calyx divided almost to the base, softly hairy on both surfaces; the larger segment 13 by 6 mm., ovate, shortly and bluntly acuminate, truncate at the apex, 7-nerved, the 3 midnerves parallel and continued beyond the truncate densely ciliate apex into 3 bristly teeth; the opposite calyx-segment 10 by 5 mm., of similar shape, the 3 parallel nerves less strong, not produced into teeth at the truncate or slightly emarginate ciliate apex; lateral segments 8 mm. long, ovate, acute, 1-nerved. Corolla 8-13 mm. long; middle lobe of lower lip quadrate, truncate, twice as long and twice as broad as the rounded lateral ones; tube 4 mm. long, constricted below the limb. Capsules 8 by 5 mm., ellipsoid, compressed, narrowed at both ends, glabrous, shining. Seeds 4 mm. long, ovoid, compressed, densely clothed with thick hairs which are longer than the nucleus.

Distribution: Punjab, Sind, Baluchistan, Rajputana Desert, Gujarat.

In Las Bela, the seeds are used as a cure for earache (Hughes-Buller).

Las Bela: Asad—.

ACANTHUS Linn.

Erect, or twining herbs or shrubs. Leaves pinnatifid, toothed, spinous or rarely entire. Flowers in terminal densely strobilate or interrupted spikes; bracts large, ovate, spinescent or small; bracteoles large, lanceolate, rarely 0. Calyx divided almost to the base; segments 4, in 2 opposite pairs, the outer the larger. Corolla 2-lipped; upper lip subobsolete, the lower lip blue or white, elongate, obovate, shortly obtusely 3-lobed. Stamens 4, didynamous, shorter than the lower lip; filaments stout, narrowed, curved below the anther, not produced at the apex; anthers oblong, 1-celled, bearded. Disk O. Ovary 2-celled; ovules 2 in each cell; style acute at the tip; stigma shortly 2-fid. Capsule ellipsoid, compressed, shining, brown,

4-seeded. Seeds compressed, orbicular, glabrous; testa lax.—Species 25.—Tropics and subtropics, Asia, Africa, Europe.

The leaves, or the whole plant, are emollient and used for poultices.

The following are used medicinally in Europe—*A. mollis* Linn., in the Gold Coast—*A. montanus* T. And.—; in Indo China, the Philippine Islands and Australia—*A. ilicifolius* Linn.—; in Malta—*A. mollis* Linn., *A. spinosus* Linn.—.

1. **Acanthus ilicifolius** Linn. Sp. Pl. (1753) 639.—*Dilivaria ilicifolia* Juss. Gen. (1789) 103; Wight Ic. t. 459.—PLATE 719A.

Stems several, erect, scarcely branched, cylindric, stout, glabrous. Leaves like those of the holly, 7.5-15 by 5-6.3 cm., oblong or elliptic, usually pinnatifid or toothed, rigid, acute or truncate at the apex, with sharp spinous teeth on the margin terminating the lateral nerves and the midrib; nerves strong and conspicuous; petioles 6 mm. long, each with 2 stipule-like spines at the base. Flowers sessile in opposite pairs, in terminal crowded or interrupted spikes varying much in length (10-38 cm.); bracts 1.3-1.7 cm. long, ovate, acute, glabrous; bracteoles similar 6-8 mm. long. Calyx glabrous; outer segments 1.6 cm. long, elliptic-oblong, obtuse, mucronulate, inner segments 1.3 cm. long, oblong, rounded and ciliate at the apex, slightly apiculate. Corolla 3.2-4.5 cm. long, blue; lower lip obovate, nearly 2.5 cm. broad, hairy on the upper surface, very shortly 3-lobed, the lobes rounded, the middle one much narrower than the lateral. Filaments thick, glabrous, slightly striate; anthers densely bearded. Style glabrous. Capsules 2.5 cm. long, oblong, obtuse, apiculate, brown, smooth and shining. Seeds 6 mm. diam., broadly ovoid or suborbicular, much compressed; testa very lax.

Distribution: Seacoast of India, Ceylon.—Malaya, Philippines, Australia, tropical and S. Africa.

In the Konkan, a decoction of the plant with sugarcandy and cumin is given in dyspepsia with acid eructations. In Goa, the leaves are used as an emollient fomentation in rheumatism and neuralgia.

The tender shoots and leaves ground small and soaked in water are applied to snake-bite (Rheede).

In Siam and Cochin China, the plant is considered a cordial and attenuant, useful in paralysis and asthma.

The tender shoots and leaves are useless in the treatment of snake-bite (Mhaskar and Caius).

Bengal: Hargoza, Harkuchkanta, Kentki—; *Bombay:* Nivagur—; *Burma:* Kaya, Khaya—; *Canarese:* Holechulli, Mulluchulli—; *Chinese:* Lao Chou Li—; *Cochin China:* Kayoro—; *English:* Sea Holly—; *French:* Feuille sainte d'Acanthe—; *Goa:* Moranna—; *Hindi:* Harkuchkanta—; *Malayalam:* Payinachhulli—; *Marathi:* Marandi, Mendli, Moranna—; *Pampangan:* Dolovario, Dulanari, Dulauari—; *Sanskrit:* Harikusa—; *Sinhalese:* Ikili, Katuikili—; *Tagalog:* Dilivario, Doloarin, Laguiolaguio, Laquislaquis, Lagiwlagiu, Tindoi, Tinglog, Tingoloi—; *Tamil:* Attumulli, Kaludaimulli, Kolimulli, Uppukkarinimulli—; *Telugu:* Alasyakampa, Alchi, Etichilla—; *Tulu:* Tudechulli—; *Uriya:* Kilichiri—; *Visayan:* Titio—.

BARLERIA Linn.

Armed or unarmed small shrubs or undershrubs. Leaves opposite, entire. Flowers showy, sessile, solitary or in dense or rather lax spikes; bracts and bracteoles large, small or 0. Calyx divided almost or quite to the base; sepals 4 in opposite pairs, the outer pair much the larger. Corolla infundibuliform; tube elongate; lobes 5, subequal, imbricate in bud. Stamens 2 fertile with oblong 2-celled anthers; usually 2 staminodes occasionally containing a little pollen also present, and often a rudimentary 5th. Disk large cupular, half embracing the ovary, often with a toothed margin. Ovary 2-celled; ovules 2 in each cell; style long, stigma 2-fid or subentire. Capsule ovoid or oblong with 2 or 4 seeds below the middle. Seeds compressed, ovoid, usually clothed with wavy silky closely appressed hairs.—Species 180.—Tropics.

A. Capsule ovoid, beak solid, 2-seeded close to the base ...... 1. *B. prionitis.*
B. Capsule oblong or narrowly ellipsoid, 4-, rarely 2- seeded, at or near the middle by the suppression of the 2 lower seeds
  I. Bract absent; bracteoles 2, divaricate, long-linear or spines, 2 outer sepals large
    a. Prickly .... 2. *B. noctiflora.*
    b. Unarmed .... 6. *B. longiflora.*

II. Bracteoles 2, opposite, close to the calyx or above the bract at the base of the pedicel, much smaller than the 2 outer sepals
  a. An erect or diffused undershrub .... 3. *B. cristata.*
  b. A large shrub .... 5. *B. courtallica.*

III. Bracteoles 2, lanceolate or elliptic, often nearly as long as the calyx
  Shrubby .... 4. *B. strigosa.*

B. prionitis Linn. is used medicinally in the Philippine Islands and La Reunion; *B. flava* Jacq. in the Gold Coast; *B. macrostegia* Nees. and *B. ovata* E. Mey. in South Africa.

1. **Barleria prionitis** Linn. Sp. Pl. (1753) 636.—PLATE 720.

A shrub 0.6-1.5 m. high, much-branched, usually prickly; bark whitish; stems and branches terete or obsoletely 4-gonous, glabrous. Leaves 9-18 by 2.5-5.7 cm., elliptic, acuminate, bristle-tipped, entire, lineolate, glabrous above, glabrous or more or less pubescent (especially the young leaves) beneath, base tapering into the petiole; main nerves about 5 pairs; petioles 0-2 cm. long, becoming shorter upwards, usually with 3 (sometimes 2 or 4) divaricate acicular spines in the axils. Flowers sessile, often solitary in the lower axils, becoming spicate above; bracts foliaceous, 16 by 4-5 mm., oblong or oblong-lanceolate, acute, bristle-tipped, nearly glabrous; bracteoles 1.3 cm. long, narrowly linear-subulate (almost spinous), bristle-tipped. Calyx divided almost to the base; one of the two outer sepals rather more than 1.3 cm. long, the opposite sepal rather less than 1.3 cm. long, 3-4 mm. broad, both oblong-lanceolate with a long mucro, the 2 inner sepals 1.5 mm. wide and as long as the shorter of the outer ones, linear-lanceolate, mucronate. Corolla 3.2-4.5 cm. long, yellow, slightly pubescent outside, glabrous inside, somewhat 2-lipped; upper lip 2 cm. long or more, deeply 4-lobed, the lobes oblong-obovate, rounded; lower lip oblong-obovate, rounded, entire; tube 1.9-2.2 cm. long. Stamens 2 fertile and 2 staminodes; filaments of the fertile stamens exserted beyond the corolla-tube, those of the staminodes very short. Capsules 2-2.5 cm. long, ovoid, with a long tapering solid beak, 2-seeded. Seeds 8 mm. diam., compressed, clothed with silky appressed hairs.

Distribution: Throughout India and Ceylon.—Tropical Asia, tropical and S. Africa.

1. *White-flowered variety*:—bitter, sweetish; heating, alexiteric; useful in toothache, leucoderma, blood complaints, bronchitis, itch.—2. *Yellow-flowered variety*:—bitter, acrid; heating, appetiser; useful in diseases of the skin and the blood, itching, pruritis, inflammations (Ayurveda).

A paste is made of the root which is applied to disperse boils and glandular swellings, and a medicated oil, made by boiling the leaves and stems with sweet oil until all the water has been driven off, is used as a cleansing application to wounds.

In the Konkan, the dried bark is given in whooping cough, and 2 tolas of the juice of the fresh bark with milk in anasarca; it acts as a diaphoretic and expectorant.

The juice of the leaf is used by the natives in Madras in catarrhal affections of children, accompanied with fever and much viscid phlegm. The ashes of the burnt plant, mixed with conjee and water, are used in dropsy and anasarca, and also in coughs (Ainslie).

In Bombay, the natives apply the juice of the leaves to their feet in the rainy season to prevent cracking. A tooth paste made of the astringent leaves and common salt is used to strengthen the gums and in tooth-ache due to caries.

The Mundas use a decoction of the whole plant in dropsy to wash the body with.

The whole plant and especially the root is much used as a diuretic and tonic medicine in Ceylon.

In La Reunion, the plant is credited with diuretic, febrifugal, and anticatarrhal properties.

Bengal: Kantajati—; *Bombay:* Kalsunda, Korhanti, Kulasunda, Vajradanti—; *Burma:* Leithaywe—; *Canarese:* Gorate, Kurantaka, Mullugoranta, Mullugorate, Mullumadarangi—; *Cutch:* Vajradaul—; *Deccan:* Lalphul—; *Gujerati:* Kantashelio, Pilikantashelio—; *Hindi:* Katsareya, Vajradanti—; *Hova:* Rointsokina—; *Madras:* Kattukkanakambaram—; *Malayalam:* Chemmulli,, Kuttivetila, Vetilakkutti—; *Marathi:* Kalsunda, Pivalakoranta, Pivalakoreta—; *Marwar:* Vajradanti—; *Naguri:* Katbakula—; *Sanskrit:* Ananta, Bana, Bhindi, Dasi, Jhinti, Jhintika, Kanaka, Kantakuranta, Katasarika, Kinkirata,

Kuranta, Kurantaka, Mahasaha, Mridukanta, Pitamlana, Pitapushpaka, Pitasaireyaka, Pura, Sahachara, Saireyaka, Sauriyaka, Shvetapushpa, Udyanapaki, Vira—; *Sinhalese:* Kattukurandu—; *Tagalog:* Cocongmanoc, Culanta—; *Tamil:* Kodippachalai, Kovindam, Kudan, Kurinji, Manjachemulli, Semmulli, Sengudan, Varalmulli, Vettargutti—; *Telugu:* Gobbi, Kondagobbi, Mullugoranta, Mullugunta, Mulugorata, Mundlagobbi, Pachagoranta—; *Tigrinia:* Essokh sibbi, Essock suerorol, Ssoksubi—; *Tulu:* Gorantedai—; *Uriya:* Dasokoranti, Kurunta, Kuruntoko—.

2. **Barleria noctiflora** Linn. f. Suppl. (1781) 290.

Small undershrub, with numerous pubescent branches. Leaves 2 cm., oblong or narrowly obovate, obtuse or acute, mucronate, pubescent but becoming glabrous, nearly sessile. Flowers axillary, solitary, bractlets 6-20 mm., spinous, branched; outer sepals 2 cm., ovate, acute, spinous-dentate, becoming membranous, veined, nearly glabrous; corolla-tube 3.2 cm., narrow, pubescent outside, lobes ovate, rounded. Capsule 1.7 cm.; seeds 4.

Distribution: Deccan, Carnatic, Ceylon.

In Tanjore, a decoction of this plant is used as an adjunct to, and substitute for, human milk.

3. **Barleria cristata** Linn. Sp. Pl. (1753) 636; Wight Ic. t. 453.—Plate 721.

Herbaceous; stems more or less appressedly hairy, densely hairy at the nodes. Leaves 6.3-10 by 2.5-4.5 cm., elliptic-oblong, acute or acuminate, hairy on both sides, lineolate above, base tapering; main nerves 6-7 pairs; petioles 3-8 mm. long. Flowers in axillary and terminal short ovate dense spikes; bracteoles conspicuous, 1.3 cm. long, linear, acute, membranous, veined, pubescent, with ciliate and often distantly toothed margins. Calyx hairy at the base; outer sepals membranous, whitish, the longer 2.5 cm. long by 8 mm. broad (within the marginal spines), broadly lanceolate, long-acuminate, mucronate and with subspinous bristle-tipped teeth on the margins, the opposite sepal similar but slightly narrower and 2 cm. long, both with raised conspicuous nerves running out into the marginal spines and with

raised conspicuous reticulate venation between the nerves, pubescent; inner sepals 8 by 2 mm., linear-lanceolate, acute, veined. Corolla pubescent outside, blue, 2.5-4.5 cm. long; upper part of the tube widely infundibuliform; lobes 2 cm. long, obovate-oblong, rounded. Capsules 1.6 cm. long, ellipsoid, acute at both ends, 4-seeded. Seeds 4 mm. diam., orbicular, compressed, silky-hairy.

Distribution: Throughout India.

The plant is bitter; heating; useful in inflammations, fevers, bronchitis, blood diseases, biliousness, tympanitis, pains, asthma (Ayurveda).

The roots and leaves are used to reduce swelling, and an infusion is given in coughs.

The plant is prescribed in the treatment of snake-bite and scorpion-sting (Sushruta).

The root, leaves, and seeds are useless in the antidotal treatment of snake-bite. The roots and leaves are also useless as a local application (Mhaskar and Caius). The plant is equally useless in the treatment of scorpion-sting (Caius and Mhaskar).

Assam: Jhinli—; *Bengal:* Jhanti, Sadajati—; *Canarese:* Kuruvaka, Jhinte—; *North-Western Provinces:* Gorpjiba, Kalabansa—; *Punjab:* Tadrelu—; *Sanskrit:* Jhinti, Kurabaka, Kuruvaka, Ragaprasava, Raktajhinti, Raktamlana, Raktapushpa, Ramalinganakamuka, Shonajhintaka, Subhaga—; *Tamil:* Nilachemmulli, Semmulli, Udamulli, Vellainilambaram—; *Telugu:* Ettapulapeddagoranta, Kodikannu, Nallapeddagoranta, Nirugoranta, Peddagoranta, Tellanilambari—; *Uriya:* Koilekha, Obidhigohoma—.

3a. **Barleria cristata** Linn. var. **dichotoma** Prain Beng. Pl. (1903) 812.—*Barleria dichotoma* Roxb. Fl. Ind. III (1832) 39.

A variety with white flowers. The favourite plant of the Brahmins, often planted near temples but also grown in gardens. Not unmistakably wild in any part of India.

The plant is used as a stimulant and demulcent.

4. **Barleria strigosa** Willd. Sp. Pl. III (1800) 379.

An unarmed shrub, 0.9-1.2 m. high. Stems more or less strigose with fulvous hairs. Leaves 11.5-15 cm. long, ovate or elliptic, acute

or acuminate, the base long-decurrent on the petiole, lineolate and sparingly fulvous strigose on the upper surface, densely strigose on the nerves and veins beneath and with bulbous-based hairs intermixed, margins ciliate, main lateral nerves 6-8 pairs. Flowers in dense fulvous-hairy unilateral spikes, often crowded at the tops of the branches; bracteoles about 1.3 cm. long, lanceolate, hairy on the back and with ciliate margins. Calyx densely strigose; outer segments subequal, 2-2.5 cm. long, elliptic-lanceolate, subacute, margins denticulate and ciliate; inner smaller, linear, acute, densely clothed with white appressed silky hairs. Corolla 3.8-5 cm. long, blue; tube pale blue, upper part funnel-shaped; lobes obovate-oblong, obtuse. Capsule 2 cm. long, acute at the top, 4-seeded, glabrous. Seeds silky-hairy.

Distribution: Upper Gangetic Plain, Bengal, Assam, Sikkim, Burma, Konkan, Deccan, S. M. Country, N. Circars.—Cultivated in gardens.

The plant is bitter, pungent; useful in ulcers, skin diseases, leucoderma, pains, itching, inflammations, bronchitis, diseases of the teeth (Ayurveda).

The root is used by the Santals as a remedy for coughs.

Bengal: Dasi—; *Bombay:* Wahiti—; *Malayalam:* Nilakurinni—; *Sanskrit:* Artagala, Bala, Bana, Dasi, Kantartagala, Nilajhinti, Nilakurantaka, Nilakusuma, Nilapushpi, Sahachara, Sairiya, Shairiyaka, Vana—; *Santali:* Railabaha—; *Tamil:* Nilambaram, Nili—; *Telugu:* Nilambaramu—.

5. **Barleria courtallica** Nees in DC. Prodr. XI (1847) 226; Wight Ic. t. 1529.

A shrub 0.9-1.2 m. high; stems and branches glabrous. Leaves 12.5-18-25 by 4.5-6.3 cm., elliptic-lanceolate, long-acuminate, glabrous, shining, lineolate on both sides, base acutely tapering into the petiole; main nerves 6-9 pairs, slender; petioles 13-38 mm. long. Flowers subsecund, in dense axillary and terminal glandular-hairy narrow spikes 2.5-10 cm. long; bracts and bracteoles 6-8 mm. long, linear-lanceolate, glandular-hairy. Calyx glandular-hairy outside; outer sepals subequal, 2-2.5 by 0.6-0.8 cm., ovate-lanceolate, bluntly long-acuminate, 7-9-nerved from the base, densely glandular-hairy

outside, appressedly silky-hairy inside, one of the pair very slightly 2-toothed at the apex; inner sepals 16-20 by 2.5 mm., linear-subulate, usually spreading outwards and not enclosed within the larger sepals, ciliate. Corolla 3.8-5 cm. long with a blue limb and yellow tube, glabrous outside; tube hairy inside at the insertion of the filaments; lobes 16 mm. long, obovate-oblong, rounded. Ovary pubescent at the apex; style pubescent at the very base. Capsules 2-2.5 cm. long, oblong, pointed, pubescent at the tip, 4-seeded. Seeds 6 mm. diam., broadly ellipsoid, compressed, silky-hairy.

Distribution: W. Peninsula.

A decoction of the root is given in rheumatism and pneumonia.

The leaves boiled in oil are used for diseases of the eye and the ear.

6. **Barleria longiflora** Linn. f. Suppl. 239.

A grey velvety pubescent shrub 60-120 cm. high, with small ovate leaves 2-4.5 cm. long and very slender-tubed white flowers 5-7.5 cm. long, solitary axillary and in short dense but few-flowered spikes. Bracteoles 1.3-2.5 cm. linear laxly patent, softly pubescent. Sepals outer ovate obtuse pubescent, scarious and very reticulate in fruit. Capsule 18 mm., 4-seeded.

Distribution: N. Circars, Deccan, Carnatic.

A decoction of the root is given in stricture, dropsy and gravel.

Sanskrit: Adyanda, Ekakantaka, Gokshuraka, Kokilaksha, Suryabhira—; *Telugu:* Pinnagorata—; *Uriya:* Koilekha—;

NEURACANTHUS Nees.

Herbs or undershrubs. Leaves entire. Flowers small, sessile and solitary in the axils of opposite bracts, densely spicate; spikes axillary (rarely terminal), elongate, strobilate, or densely capitate; bracts imbricate, strongly nerved; bracteoles 0 or minute. Calyx 2-partite, the upper segment 3-toothed or 3-lobed. the lower 2-toothed, or 2-lobed, or 2-partite. Corolla tubular-infundibuliform; tube more or less dilated above; limb plicate, subbilabiate or entire, when 2-lipped the upper lip narrow, shortly 2-lobed or 2-toothed, the lower

3-lobed or 3-angled. Stamens 4, didynamous, inserted on the middle of the tube, included; anthers of the lower and longer pair perfectly 2-celled, those of the upper pair with one perfect and one imperfect cell. Disk inconspicuous. Ovary 2-celled; ovules usually 2 in each cell; style short, glabrous; stigma of one oblong lobe. Capsule oblong, glabrous, 4- or 2- seeded. Seeds much compressed, ovoid or suborbicular, hairy.—Species 12.—Palæotropics.

The genus is not therapeutically defined.

1. **Neuracanthus sphærostachyus** Dalz. in Kew Journ. Bot. II (1850) 140.—*N. Lawii* Wight Ic. t. 1531.

Stems erect, 0.45-0.6 m. high, numerous from a perennial root, simple, obtusely quadrangular, more or less scabrous-pubescent. Leaves subsessile, 6.3-10 by 3.8-5.7 cm., elliptic-oblong, obtuse, very shortly acuminate, lineolate on both sides, nearly glabrous, base rounded, truncate or subcordate; main nerves about 8 pairs. Flowers in globose congested silky-hairy spikes sessile in the opposite axils, much enlarged after flowering, sometimes to 3.8 cm. diam., bracts 1.3 by 1 cm., purplish, broadly elliptic or suborbicular, shortly and abruptly acuminate, hairy on both sides and with ciliate margins, strongly 5-7-nerved from the base, reticulately veined. Calyx 1.3 cm. long, 2-lipped to the base, densely silky-hairy on both sides; upper lip 3-lobed about half way down, the lobes lanceolate, acute, densely ciliate, veined; lower lip divided almost to the base, the segments lanceolate, acute, ciliate. Corolla 1.3 cm. long with white tube and blue limb; tube slender, cylindric, as long as the calyx; limb infundibuliform, plicate, entire, nearly 1.3 cm. across when expanded, with 5 hairy 3-nerved penicillate bands on the outside, 2 of which are close together, the others distant from one another. Capsules 13 by 5 mm., ovoid, subacute, shortly attenuated at the base, quite glabrous. Seeds 4 mm. diam., orbicular, densely silky.

Distribution: Konkan, W. Ghats, Deccan, S. M. Country.

Powdered and made into a paste the root is used to cure ringworm. It is also administered in that form of indigestion in which fatty or saponaceous grape-like masses are observed in the stools.

Gujerati: Ganthera—; *Marathi:* Ganthera, Ghosvel—.

ANDROGRAPHIS Wall.

Annual erect or procumbent herbs or small shrubs. Leaves entire. Flowers in lax panicles, or dense and subcapitate axillary and terminal racemes often unilateral; bracts small; bracteoles minute or 0. Calyx 5-partite; segments narrow. Corolla small, tubular, 2-lipped, pubescent. Stamens 2; filaments ciliate or setulose; anthers 2-celled, exserted, the cells oblong, parallel, subequal, muticous, bearded at the base. Ovary 2-celled; ovules 3-6 in each cell; style slender; stigma shortly 2-lobed. Capsule linear-oblong or elliptic, compressed contrary to the septum. Seeds hard, subquadrate or oblong, rugosely pitted, glabrous; retinacula lanceolate.—Species 20. —Tropical Asia.

1. Capsule linear, thrice as long as broad .... 1. *A. paniculata.*
2. Capsule elliptic, 2-3-times as long as broad .... 2. *A. echioides.*

The genus exhibits antipyretic properties.

A. paniculata Nees. is used medicinally in Cochin China.

1. **Andrographis paniculata** Nees in Wall. Pl. As. Rar. III (1832) 116; Wight Ic. t. 518.—PLATE 722B.

An erect branched annual 0.3-0.9 m. high; branches sharply quadrangular, often narrowly winged in the upper part. Leaves 5-7.5 by 1.2-2.5 cm., lanceolate, acute, glabrous, slightly undulate, pale beneath; base tapering; main nerves 4-6 pairs, slender; petioles 0-6 mm. long. Flowers small, solitary, distant, in lax spreading axillary and terminal racemes or panicles, the whole forming a large pyramidal paniculate inflorescence; bracts 2.5 mm. long, lanceolate; bracteoles similar or 0; pedicels 0.8-4 mm. long, glandular-pubescent. Calyx 3 mm. long; sepals equal, linear-lanceolate, glandular-pubescent. Corolla rose-coloured, 1 cm. long, hairy outside, 2-lipped rather more than half way down; tube 5 mm. long, slightly enlarged below the limb; upper lip 4 mm. long, oblong, 2-toothed at the apex; lower lip equal in length, deeply 3-lobed, the lobes 2.5 mm. long, linear-oblong, subobtuse. Filaments flattened, hairy in the upper

part; anthers beared at the base. Ovary glabrous; style slightly pubescent. Capsules 20 by 3 mm., linear-oblong, acute at both ends. Seeds numerous, subquadrate, osseous rugosely pitted, glabrous, yellowish brown.

Distribution: Throughout India, Ceylon, sometimes cultivated.

This bitter shrub is well-known under the name of *Kalmegh*, and forms the principal ingredient of a household medicine called *Alui*, extensively used in Bengal. The expressed juice of the leaves, together with certain spices, such as cardamoms, cloves, cinnamon, etc., is dried in the sun, and made into little globules, which are prescribed for infants to relieve griping, irregular stools and loss of appetite.

The plant is very useful in general debility, dysentery and certain forms of dyspepsia.

The roots and the leaves are febrifuge, stomachic, tonic, alterative and anthelmintic.

Green leaves with the leaves of Indian birthwort (*Aristolochia indica*) and the fresh inner root-bark of country sarsaparilla, made into an electuary, is used by hakims as a tonic and alterative in syphilitic cachexia and foul syphilitic ulcers.

The Yanadees, a wandering gipsy tribe in the Madras Presidency, constantly carry a supply of pills made of Creat fresh leaves, and the pulp of the ripe tamarind, which they consider antidotal to the venom of the cobra. A pill made into a paste with water is applied to the bitten part, and some of it is put into the eyes; two pills are given for a dose every hour or two internally.

A saturated infusion of the whole plant in a dose of about half a pint, is administered to fever patients by the Mundas of Chota Nagpur. It is considered as a specific (*Encyclopœdia mundarica*).

The leaves are not an antidote to cobra-venom (Mhaskar and Caius).

Arabic: Qasabhuva, Qasabuzzarirah—; *Bengal:* Kalmegh, Mahatita—; *Canarese:* Kreata, Nelabevinagida—; *Deccan:* Charayetah, Kalaphnath—; *English:* Creat—; *Gujerati:* Kariyatu, Kiryata, Kiriyati, Olikiriyat—; *Hasada:* Kalameg—; *Hindi:* Charayetah, Kiryat, Mahatita—; *Java:* Sadilata—; *Malayalam:* Kiriyattu,

Nalaveppu—; *Marathi:* Olenkirayat—; *Persian:* Nainehavandi—; *Sadani:* Bhuinim—; *Sanskrit:* Bhunimba, Kirata—; *Sinhalese:* Hinbinkohomba, Ninbinkohomba—; *Tamil:* Nilavembu, Shiratkuchi—; *Telugu:* Nelavemu—; *Uanadi:* Creat—.

2. **Andrographis echioides** Ness in Wall. Pl. As. Rar. III (1832) 117; Wight Ic. t. 467.

Herbaceous, erect, 15-45 cm. high; stem quadrangular, grooved, with a few spreading branches from near the base often not branched, clothed with spreading hairs. Leaves 3.2-7.5 by 1-2.5 cm., sessile, oblong, obtuse, more or less sparsely hairy, ciliate on the margins, base cuneate; main nerves 4-6 pairs. Flowers numerous, placed along the upper side of a slender glandular-hairy rhachis, in axillary racemes shorter than the leaves; bracts 2 mm. long, lanceolate; bracteoles minute, 0.8 mm. long, subulate. Calyx 4-6 mm. long, glandular-hairy, divided almost to the base; sepals narrowly linear (scarcely 0.8 mm. wide) acute, ciliate, elongating in fruit. Corolla densely pubescent outside, pink or white, 1-1.6 cm. long, 2-lipped a little less than half way down; upper lip obovate-oblong, rounded; lower lip 3-lobed about half way, blotched with purple, the lobes oblong, obtuse, the middle lobe slightly larger than the lateral ones. Filaments flat, sparsely hairy; anthers bearded. Ovary hairy; style pubescent. Capsules 1-1.3 cm. long, half as broad as long, elliptic-lanceolate (in horizontal section), compressed, acute at both ends, hairy. Seeds 2.5 by 1.2 mm., oblong, not compressed, rugosely pitted, glabrous.

Distribution: Tropical India in the drier districts, Ceylon.

The juice of the plant is given in fever (Rheede).

Deccan: Ranjimani—; *Gujarat:* Kalunkariatun—; *Malayalam:* Pitumba—; *Marathi:* Ranchimani—.

HAPLANTHUS Nees.

Erect herbs. Leaves entire. Flowers axillary, pseudo-verticillate, surrounded by numerous abortive branchlets reduced to spine-like cladodes terminated by 2-3 minute spinous or subspinous points (reduced leaves); bracts and bracteoles small. Calyx 5-partite;

segments linear-lanceolate, subequal. Corolla small, tubular; tube slightly enlarged above; limb 2-lipped, the upper lip 2-fid, the lower obtusely 3-lobed. Stamens 2, shorter than the corolla, inserted below the throat; filaments flattened; anthers connivent, subcoherent, 2-celled, dorsifixed, the cells ovate, more or less unequal, muticous, one usually bearded on the back. Disk thick, prominent. Ovary 2-celled; ovules 3-8 in each cell; style acute or obliquely truncate at the apex. Capsule linear-oblong, compressed contrary to the septum, 6-16-seeded from the base. Seeds oblong-ellipsoid, slightly or not compressed, densely shortly hairy when wetted.—Species 3.—Indo-Malayan.

1. Cladodes in fruit often 2.5-3.8 cm. long .... 1. *H. verticillaris.*
2. Cladodes in fruit 13 mm. .... 2. *H. tentaculatus.*

The genus is antipyretic.

1. **Haplanthus verticillaris** Nees in DC. Prodr. XI (1847) 513.

Herbaceous, 45-75 cm. high; stem glabrous at the base, more or less pubescent upwards. Leaves 6.3-10 by 3.8-5 cm., ovate, acuminate, or acute, or subobtuse, pubescent above and on the nerves beneath; base shortly cuneate; main nerves 8-10 pairs, slender, prominent beneath; petioles 2.5-5 cm. long. Axillary spines (cladodes) 2.5-3.8 cm. long, quadrangular, usually with 2 sharp naked spinous teeth at the apex, clothed with short glandular and long spreading hairs or sometimes nearly glabrous. Flowers in the midst of the spines, sessile; bracteoles subulate, finely pointed, longer than the calyx. Calyx 4 mm. long, divided almost to the base; sepals glandular-pubescent, lanceolate with a subulate point. Corolla 1.6 cm. long, slightly pubescent outside, tubular, 2-lipped about ¼-way down; limb dark lilac, marked with darker lines, greenish white inside the throat. Capsules 1-1.3 cm. long, narrowly oblong, acute, grooved, glabrous, white. Seeds 2.5-3 by 1.2 mm., oblong, compressed, yellowish brown, densely hairy when wetted.

Distribution: Bundelkhand, W. Rajputana, Konkan, W. Ghats, S. M. Country, Bellary, Deccan, Assam.

It is given in fever.

Hindi: Kastula—; *Marathi:* Jhankara—; *Western India:* Kalakirayat, Kalayakara—.

2. **Haplanthus tentaculatus** Nees in DC. Prodr. XI (1847) 513.

A slender herb; stems quadrangular in the upper part, glandular-pubescent throughout. Leaves 5-10 by 3.2-5 cm., ovate, acuminate, more or less pubescent, decurrent into the petiole which is therefore often obscure; main nerves 8-10 pairs, slender; petioles obscure owing to the decurrent leaf-blade. Axillary spines (cladodes) slender, 6-20 cm. long, shortly densely and softly villous and also with long hairs, with 2 or 3 more or less flattened villous (harly spinous) teeth (reduced leaves) at the apex. Flowers sessile in the midst of the cladodes; bracteoles subulate, shorter than the calyx. Calyx 4 mm. long, divided almost to the base; sepals linear-subulate, densely hairy. Corolla 1.3 cm. long, blue or lilac, 2-lipped about ¼-way down. Capsules 8 mm. long, oblong, pointed, pubescent.

Distribution: Upper Gangetic Plain, Gujarat, Konkan, Deccan.

It is given in fever.

Hindi: Kastula—; *Marathi:* Jhankara—; *Western India:* Kalakirayat, Kalayakara—.

GYMNOSTACHYUM Nees.

Herbs or undershrubs. Leaves cauline or subradical, entire, sinuate, crenulate or toothed. Flowers subsessile or shortly pedicellate, in axillary cymes or in a terminal panicle, often spicate or racemose; bracts and bracteoles usually minute. Calyx deeply divided; lobes equal, linear-lanceolate. Corolla 2-lipped; tube narrow, cylindric; lobes subequal, oblong-elliptic, imbricate. Stamens 2, nearly equalling the corolla, rarely exserted beyond it; filaments often hairy near the base; anthers 2-celled, the cells subequal, oblong or ovate, hairy or glabrous. Ovary 2-celled; ovules numerous in each cell; style slender; stigma subentire. Capsule linear, pubescent or glabrous, 16-24-seeded. Seeds broadly ovoid, compressed, hairy.—Species 25.—Tropical Asia.

The genus exhibits antipyretic properties.

1. **Gymnostachyum febrifugum** Benth. in Flora (1849) 558.—*G. alatum* Wight Ic. t. 1525.

Nearly stemless. Leaves 16.5 by 7.5 cm., ovate, decurrent on the petiole, subentire or undulate-crenulate, above lineolate nearly glabrous or minutely sparsely setulose, beneath paler glabrous or pubescent on the nerves. Panicles 15-30 cm., puberulous, in appearance radical; flowers opposite, solitary or in very small few-flowered cymes; bracts small, narrow; bracteoles 0. Sepals 3-4 mm., glabrous or puberulous. Corolla glabrous, 3.2 cm., upper half inflated. Anthers ovate, hairy. Capsule 2.5 cm. long.

Distribution: Madras Presidency: W. coast and W. Ghats, S. Kanara, Malabar, Travancore.

The root is a febrifuge.

Canarese: Nelamuchchala—.

PHLOGACANTHUS Nees.

Shrubs or tall herbs. Leaves entire or obscurely crenate. Flowers in terminal thyrses or narrow panicles, rarely in axillary racemes or cymes; bracts small, bracteoles none. Calyx 5-partite, segments very narrow. Corolla tubular, curved upwards, tube narrowly funnel-shaped, limb more or less 2-lipped; lobes ovate or oblong, connivent, spreading or recurved, imbricate in bud. Stamens 2, with sometimes 2 small rudiments added; anthers 2-celled, oblong, muticous, glabrous. Ovary with 5-8 ovules in each cell, glabrous, style filiform, stigma subsimple. Fruit an elongated many-seeded capsule, somewhat 4-angled. Seeds from the base of the capsule, lenticular, ovate in outline, glabrous or densely puberulous..—Species 15.—Indo-Malayan.

The genus exhibits bechic properties.

1. **Phlogacanthus thyrsiflorus** Nees in Wall. Pl. As. Rar. III (1832) 99.

An evergreen shrub, up to 2.4 m. high, with smooth grey bark; shoots swollen at the nodes, often tinged with dull purple, 4-angled.

Leaves drooping, 15-20 cm. long, elliptic-lanceolate, obtuse, subentire, dark green and glossy above, paler beneath and densely punctulate, petioles 2-2.5 cm. long. Flowers pedicelled, crowded in verticils of four, forming terminal elongate thyrsoid panicles up to 30 cm. long; bracts subulate, conspicuous in bud, 5-6 mm. long, arranged in threes, the 2 inner ones persistent; the outer larger, caducous. Calyx-segments 5-8 mm. long, bristle-like, hairy. Corolla orange-coloured or brick red, villous, tube laterally compressed; upper lip suberect, deeply emarginate; lower spreading, of 3 ovate acute lobes. Anthers dark brown, pollen white. Capsule 3.8 cm. long, linear-clavate, glabrous. Seeds 12-14, densely hairy.

Distribution: Upper Gangetic Plain, subtropical Himalaya up to 4,000 ft. from the Ravi to Bhutan, Assam, Chota Nagpur, Upper and Lower Burma.

In the Punjab, it is put to the same medicinal uses as *Adhatoda vasica.*

Assam: Bakhatita, Titaphul—; *Garhwal:* Kaldona, Kawadoni—; *Lepcha:* Rheeom, Sumcher—; *Michi:* Bashkah—; *Nepal:* Chua, Shechin, Sua—; *Punjab:* Lalbahuk—; *Ramnagar:* Kaldona, Kawadoni—.

Crossandra Salisb.

Undershrubs. Leaves entire or undulate, subdentate. Spikes linear-oblong; bracts imbricate; bracteoles linear; flowers sessile, yellow. Sepals 5, ovate, acute, 2 inner much smaller. Corolla-tube linear, incurved; limb on one side of 5 subequal, elliptic lobes, imbricate in the bud. Stamens 4, didynamous; anthers 1-celled, muticous; connective mucronate. Style minutely 2-lobed at the tip; ovary 4-ovulate. Capsule oblong, acute, 4-seeded. Seeds compressed, orbicular, adpressedly scaly; scales of numerous hairs coalescing nearly to their tips, which are seen imperfectly free when moistened.—Species 25.—Tropical Asia, Africa, Madagascar.

The genus is not therapeutically defined.

1. **Crossandra undulaefolia** Salisb. Parad. Lond. (1805) t. 12; Bot. Mag. t. 2186.—*C. infundibuliformis* Nees in Wall. Pl. As. Rar. III, 98; Wight Ic. t. 461.

An undershrub 60-90 cm. high (in cultivation often higher); branches terete, glabrous or nearly so. Leaves 4 in a whorl (decussate pairs inserted close to one another), 10-15 by 3.2-5 cm., rather thick, lanceolate, acute, glabrous, shining, base much attenuated into the petiole; main nerves about 8 pairs, slender; petioles 13-25 mm. long, often obscure owing to decurrent leaf-blade. Flowers numerous, in axillary often long-pedunculate quadrangular narrow spikes 7.5-15 cm. long; bracts much imbricate, 16 by 6 mm., elliptic-lanceolate, mucronate, glandular-pubescent, nerved, ciliate; bracteoles 13 by 1.3 mm., narrowly linear with subulate points, glandular-pubescent. Calyx 5-partite to the base; upper sepal 13 by 3 mm., 2-nerved, 2-toothed; 2 lower sepals 13 by 2 mm., 1-nerved, all three lanceolate, very acute; penicillate at the apex and ciliate with long white jointed fine hairs; inner sepals 10 by 1.3 mm., lanceolate-subulate, ciliate towards the tip with fine jointed hairs. Corolla orange-yellow, pubescent outside; tube 2 cm. long, slender; limb 3.8 cm. across. Capsules 16 mm. long, oblong, subacute, glabrous. Seeds 4-5 mm. diam., compressed, densely clothed with fringed scales.

Distribution: W. Peninsula, Ceylon. Cultivated in N. India, Bengal and Malaya.

The plant is credited with aphrodisiacal properties.

Canarese: Abbolige—; *Madras:* Kanagambaram—; *Malayalam:* Mannakkurinni—; *Tamil:* Pavalakkurinja, Ponnirangalandagarambuvalalamarudonri, Sagasari, Sembayiravuppundu, Tindiyam—; *Telugu:* Gobbi, Kanakambramu—; *Tulu:* Abbolige—.

Asystasia Bl.

Herbs or undershrubs. Leaves opposite, entire. Flowers in lax or dense usually 1-sided simple or compound spikes or racemes; bracts and bracteoles linear, usually shorter than the calyx. Calyx deeply divided; segments equal, linear or linear-lanceolate. Corolla-tube inflated above; lobes subequal, imbricate in bud. Stamens 4,

all perfect, didynamous, subequal; anthers oblong, the cells parallel, approximate, minutely spurred or submuticous at the base. Ovary 2-celled; ovules 2 in each cell; style linear; stigma minutely 2-fid or subcapitate. Capsule elliptic-clavate with contracted solid base, 4-seeded. Seeds compressed, orbicular or irregularly angular, glabrous, rugose or tuberculate.—Species 30.—Palæotropics.

The genus is not therapeutically defined.

1. **Asystasia gangetica** T. Anders. in Thwaites Enum. 235. —*A. coromandeliana* Nees in Wall. Pl. As. Rar. III (1832) 89.— *A. violacea* Bot. Mag. t. 5882.

Erect or procumbent, sometimes climbing among bushes. Stems 30-90 cm. long, much-branched, obtusely quadrangular, glabrous. Leaves 2.5-5.7 by 2-3.8 cm., ovate, acute, lineolate, dark green and glabrous above, paler and slightly pubescent on the nerves beneath, base usually rounded or subcordate, rarely acute; main nerves 5-6 pairs; petioles 1.3-2.5 cm. long. Flowers secund, in long lax terminal and axillary spike-like racemes; pedicels of the lower flowers reaching 3 mm. long, those of the upper shorter or almost 0; bracts and bracteoles below the pedicels 2.5-3 mm. long, ovate-lanceolate, acute, ciliate. Calyx nearly 6 mm. long, divided to the base or nearly so; sepals linear-lanceolate, acute, pubescent. Corolla 3.8 cm. long, pubescent outside, pale-blue with a yellowish tube and usually a purple blotch on the lowest lobe; tube 2 cm. long, inflated in the upper part for about two-thirds of its length; lobes of the limb rounded. Ovary hairy; lower part of style hairy. Capsules 2.5-3.2 cm. long with long solid base, clavate, pointed, pubescent, usually constricted about the middle of the enlarged upper part, 4-seeded. Seeds 5 mm. diam., tuberculate, glabrous.

Distribution: N. Circars, Deccan, Carnatic, W. Peninsula, Ceylon.—Tropical and S. Africa.

The juice of the plant is used as an anthelmintic. It is also given in swellings and rheumatism.

Ceylon: Peypatchotti—; *Hova:* Avokombily—; *Sinhalese:* Puruk—; *Twi:* Orborfo fan—.

LEPIDAGATHIS Willd.

Herbs or undershrubs often pubescent. Leaves entire or crenate-serrate. Flowers sessile, usually capitate, sometimes opposite or solitary; heads axillary or terminal, almost always dense, often 1-sided, sometimes fascicled; bracts usually conspicuous; bracteoles usually smaller than the bracts. Calyx 5-lobed, the lobes unequal, the 2 lower often more or less connate, making the calyx 4-partite, the connate segments usually easily separable. Corolla small, 2-lipped; tube narrowly cylindric below, often constricted beneath the throat, suddenly swollen at or above the middle; upper lip erect-patent, usually notched or 2-fid; lower lip with 3 spreading lobes. Stamens 4, didynamous, attached at the base of the throat, included; anthers 2-celled, 1 of the cells often attached higher up than the other, the cells frequently bearded, somewhat divergent. Disk annular. Ovary 2-celled; ovules 2 (rarely 1) in each cell; style recurved; stigma capitellate, shortly 2-lobed or entire. Capsule ovoid-oblong or lanceolate, compressed. Seeds 2 or 4, compressed, ovoid, oblong or orbicular, hairy.—Species 80.—Tropics.

A. Spikes chiefly aggregated, globose, near the base of the stem
  1. Bracts and bracteoles elliptic ovate or obovate, suddenly spinose-acuminate .... 1. *L. cristata.*
  2. Bracts lanceolate, spinescent, patently ciliate upwards .... 3. *L. hamiltoniana.*
B. Spikes mostly axillary, scattered .... 2. *L. trinervis.*

The genus exhibits bitter tonic properties.

1. **Lepidagathis cristata** Willd. Sp. Pl. III (1800) 400; Wight Ic. t. 455.—PLATE 723.

Rootstock perennial; stem scarcely any; branches numerous, spreading on all sides close to the ground, sometimes rooting, slender, quadrangular (sometimes almost winged), glabrous or nearly so. Leaves opposite, sessile, 2-3.8 by 0.3-1 cm., linear-oblong or lanceolate-oblong, lineolate above, hairy on the nerves beneath. Flowers in a subradical globose head (sometimes with 1 or 2 smaller heads added) on the lower part of the leafy branches; bracts 8 mm. long, ovate, acuminate, spinous-pointed, hairy; bracteoles membranous, hairy, spinescent. Calyx 8 mm. long, 4-partite about ¾ the way

down, densely softly hairy on both surfaces; the 2 larger outer segments 3 mm. broad, elliptic, acute, the lower segment 2-fid; the 2 lateral segments 1.2 mm. broad, all ciliate and spinous-pointed. Corolla hairy outside, reaching 1.3 cm. long, white or pale pink, dotted with brown or purple spots, 2-lipped about ½-way down; tube narrow, constricted below the limb and then suddenly expanded uppards; upper lip 4 mm. long, oblong, obtuse, notched at the apex; lower lip 6 mm. long, divided nearly to the middle into 3 obovate obtuse slightly crenulate lobes, the middle lobe the broadest. Stamens slightly exserted beyond the corolla-tube; filaments glabrous; anthers 2-celled, one of the cells rather higher up than the other. Ovary glabrous; style slightly pubescent. Capsules 5 mm. long, ovoid, subacute, glabrous, grooved on the 2 sides, with scarious back, 2-seeded. Seeds large for the size of the capsule, 3 mm. long, ovoid-oblong, rounder, densely clothed with long hygroscopic mucilaginous hairs.

Distribution: Konkan, Deccan, N. Circars, Carnatic.

A bitter herb used in fevers as a tonic.

It is applied to cure itchy affections of the skin.

The ash of the dry plant is employed in Chota Nagpur as an application to sores.

Bombay: Kolichechutar—; *Madras:* Karappanpundu—; *Marathi:* Bhuyaterada—; *Santali:* Otdhompo—.

2. **Lepidagathis trinervis** Nees in Wall. Pl. As. Rar. III (1832) 96.

A small suffruticose diffuse plant; rootstock woody; branches numerous, 12.5-25 cm. long, slender, quadrangular, with many nodes. Leaves 2.5-4.5 cm. by 3-6 mm., sessile, linear, subacute, entire, glabrous or nearly so, the margins often scabrid, 3-nerved from a slightly tapering base, the midnerve stronger than the lateral ones which are close to the margin. Flowers in axillary sessile ovoid spikes 1.3-2 cm. long, usually 2 or more closely packed together so as to appear like a single head; bracts often coloured, usually glabrous or nearly so, rather less than 1.3 cm. long, ovate or ovate-elliptic, with a recurved cuspidate spine almost as long as the leafy part;

bracteoles as long as the bracts, oblong-lanceolate, aristate-acuminate, membranous. Calyx membranous, 1 cm. long, 5-partite (the lower lobes scarcely at all connate above the base) to about 1.5 mm. from the base; the 3 outer segments nearly equal in length, the upper slightly broader, all lanceolate, very acute, not spinous-pointed, densely hairy inside, nearly glabrous outside; inner lateral segments shorter and narrower, linear, acute, hairy on both sides. Corolla densely hairy in bud, white, spotted with yellow, brown and purple, 6-8 mm. long; tube short; upper lip oblong, rounded at the apex; lower lip 3-lobed, the lobes obtuse, the lateral narrower than the middle one. Capsules 6 mm. long, ovoid-lanceolate, subacute, compressed, 2-seeded, grooved on the sides, the back scarious, irregularly rupturing. Seeds 2.5-3 mm. long, oblong, rounded at the apex, clothed with long mucilaginous hygroscopic hairs many times longer than the nucleus.

Distribution: Rajputana Desert, Central India, Chota Nagpur, N.-W. Himalaya, W. Peninsula. S. India.

The plant is a bitter tonic.
Gujerati: Harancharo, Paniru—.

3. **Lepidagathis hamiltoniana** Wall. Cat. 2422.

A herb with a perennial rootstock, erect or several diffuse 4-angled stems 15-45 cm. high and linear leaves 5-10 cm., or attaining 15 cm. by 10 mm., acute, subsessile, nearly glabrous except the minutely scabrid-ciliate margins. Flowers 13 mm. long in very congested spikes forming prickly cushions at the base of the plant. Bracts, bracteoles and sepals all lanceolate acuminate and ending in a spine. Corolla 5 mm. to the ventricose part, nerved, lower lip nearly 13 mm. diam. with the midlobe somewhat shovel-shaped.

Distribution: Bihar, Bundelkhand, Chota Nagpur.

The plant is used medicinally by the Mundas of Chota Nagpur. The whorl, in flower or in seed, is pounded and fried in *Koronj* oil; this is rubbed on itch, also on the head sores of small children. When a mother's breasts swell and milk does no more pass through the nipples, the crushed root is rubbed on the breast (*Encyclopædia Mundarica*).

Mundari: Agiajanum, Buruagiajanum, Burusenggelsui, Gharia, Otesenggelsui, Senggelsui—.

JUSTICIA Linn.

Herbs or shrubs. Leaves entire. Flowers sessile or subsessile, in spikes or panicles (rarely solitary or clustered), usually small; bracts various; bracteoles narrow or obsolete. Calyx 5- or 4- partite; segments narrow. Corolla 2-lipped; tube equalling or shorter than the limb; upper lip 2-lobed or subentire; lower lip 3-lobed, the lobes imbricate in bud. Stamens 2; filaments often dilated; anthers 2-celled, one cell higher up than the other, the cells oblong or round, the lower always with a white basal appendage. Ovary 2-celled; ovules 2 in each cell; style filiform; stigma shortly 2-fid. Capsule ovoid or ellipsoid, 4-seeded, sometimes seed-bearing from the base, sometimes contracted below into a solid stalk and seed-bearing at the apex. Seeds ovoid or suborbicular, more or less compressed, tubercular, scaly or glochidiate.—Species 300.—Tropics.

1. Leaves short-petioled, lanceolate, glabrous .... 1. *J. gendarussa.*
2. Leaves petioled, elliptic or lanceolate, hairy or glabrate ...... 2. *J. procumbens.*

Stomachic, emetic, and diuretic.

The following species are used medicinally in China—*J. gendarussa* Linn., *J. procumbens* Linn.—; in the Philippine Islands, the Malay Archipelago, La Reunion, Zanzibar, Abyssinia—*J. gendarussa* Linn.—; in Madagascar—*J. gendarussa* Linn., *J. haplostachya* T. Anders.—; in Guiana—*J. coccinea* Aublet—.

1. **Justicia gendarussa** Burm. Fl. Ind. (1768) 10.—PLATE 724.

An undershrub 0.6-1.2 m. high, the subterete branches with sometimes raised lines or a line of pubescence. Leaves lanceolate or linear-lanceolate, 7.5-12.5 cm. long, glabrous except when very young. Flowers white, spotted purple within, in interrupted spikes 5-12.5 cm. long from the uppermost leaf-axils and often forming a terminal panicle. Bracts linear, about 3 mm. only. Calyx 3.8-5 mm.

with nearly glabrous linear segments. Corolla 1.3 cm. Capsule 1.3 cm., clavate, glabrous.

Distribution: Probably a native of China.—Cultivated throughout India and often found as an escape.

The plant is pungent, bitter, hot, dry; useful in bronchitis, inflammations, vaginal discharges, dyspepsia, tympanitis, eye diseases, fevers (Ayurveda).

The leaves and tender shoots are diaphoretic and they are given in chronic rheumatism in the form of decoction.

An oil prepared from the leaves when applied locally is said to be useful in eczema, and an infusion of the leaves is given internally in cephalalgia, hemiplegia, and facial paralysis.

The juice of the fresh leaves is dropped into the ear for earache, and into the corresponding nostril on the side of the head affected with hemicrania.

The Malays employ the plant as a febrifuge, the Javanese as an emetic.

In Madagascar, the plant is chiefly employed for rheumatic affections. A decoction of the leaves or the flower tops is generally used for the purpose as drink or as fumigation. A decoction of the root boiled in milk is given in rheumatism, dysentery, and jaundice.

In La Reunion, a decoction of the leaves is used as an emetic and stimulant. It is considered a good remedy for rheumatism.

A chemical and physico-chemical examination of the plant was carried out by Nag and Bose (17th Ind. Sc. Congress; Allahabad, 1930).

Arabic: Aslakavad—; *Bengal:* Jagatmadan, Jogmodon—; *Bombay:* Kalaadulsa, Tao—; *Burma:* Bavanet, Bawanet—; *Canarese:* Aduthodagidda, Karalakkigidde, Karinekki, Nachukaddi—; *Chinese:* Ch'in Ch'iu—; *Deccan:* Kalishanbali—; *Hindi:* Nilinargandi, Udisanbhalu—; *Java:* Gandaroesa—; *La Reunion:* Guérit petite colique, Natchouli, Nitchouli—; *Madagascar:* Dingadingambazaha—; *Malayalam:* Karinochil, Vatankolli, Vatankurunnu, Vatankutti—; *Marathi:* Bakas, Kalaadulsa, Tao—; *Mauritius:* Natchouli,

Nitechouli—; *Persian:* Banjangashtesiyah—; *Sanskrit:* Bhutakeshi, Gandharasa, Indrani, Kapika, Krishnanirgundi, Krishnasurasu, Marupatni, Nilamanjari, Nilanirgundi, Nilasinduka, Nilasinduvar, Nilika, Nirgundi, Pitasaha, Shitabhiru, Shophalika, Sinduka, Vanaja, Vanendrani—; *Sinhalese:* Kaluvarania—; *Tagalog:* Capanitulot, Paritulot—; *Tamil:* Karunochi, Vadaikkutti—; *Telugu:* Addasaramu, Gandharasamu, Nallanochili, Nelavavili, Nallavavili—; *Uriya:* Kukurodonti—; *Visayan:* Bunlao—.

2. **Justicia procumbens** Linn. Sp. Pl. (1753) 15.—PLATE 725.

Stems diffuse, slender, with many divaricate branches, rooting at the lower nodes, glabrous or pubescent. Leaves 1.3-3.8 by 0.6-2 cm., variable, elliptic or ovate, or lanceolate, usually obtuse at both ends, softly pubescent on both sides; petioles 3-13 mm. long. Flowers in rather dense cylindric terminal spikes 1.3-3.8 cm. long; bracts 5 by 1 mm., linear-lanceolate, acute, hairy, with scarious ciliate margins; bracteoles similar to the bracts. Calyx 4 mm. long, divided almost to the base; segments linear-subulate, narrower than the bracteoles, with scarious ciliate margins. Corolla pale violet-pink, 6 mm. long; tube about equalling the limb, funnel-shaped; upper lip broadly ovate and concave in the lower, narrowly subquadrate in the apical part, notched; lower lip very shortly 3-lobed. Filaments glabrous. Ovary glabrous. Capsules 4 by 1.5 mm., oblong, shortly pointed, often constricted between the seeds, pubescent at the tip; solid stalk 1.2 mm. long. Seeds 1.2 mm. long, finely tuberculate.

Distribution: Konkan, W. Ghats of Bombay and Madras Presidencies, W. coast of Madras Presidency to Travancore, Ceylon.—Malaya, Australia.

The medicinal properties are the same as those of *Fumaria parviflora* (Ayurveda, Yunani).

The juice of the leaves is squeezed into the eye in cases of ophthalmia (Ainslie).

Bombay: Ghatipitpapra, Pitpapada—; *Chinese:* Chueh Ch'uang—; *Sinhalese:* Mayani—.

ADHATODA Tourn. ex Medic.

Tall shrubs. Leaves entire, attenuated at each end. Flowers subsessile in the axils of opposite bracts, in axillary and terminal pedunculate spikes often forming a thyrsus at the ends of the branches or fascicled in the upper axils; bracts herbaceous, elliptic or oblong, exceeding the calyx; bracteoles subsimilar, nearly as large as the bracts. Calyx shortly campanulate; lobes 5, imbricate, the 2 lowest often subconnate. Corolla 2-lipped; tube short; upper lip galeate, subentire; lower lip spreading, 3-lobed. Stamens 2, inserted near the top of the corolla-tube; anthers 2-celled, the cells acute, minutely apiculate but not tailed at the base. Disk cupular. Ovary 2-celled, usually tomentose; ovules 2 in each cell; style filiform, subclavate above; stigma entire. Capsule oblong, clavate, contracted below into a long solid stalk. Seeds usually 1 or 2, suborbicular, compressed, rugose.—Species 100.—Tropics.

A. vasica Nees is used medicinally in La Reunion.

1. **Adhatoda vasica** Nees in Wall. Pl. As. Rar. III (1832) 103.—PLATE 722A.

A dense shrub 1.2-2.4 m. high with many long opposite ascending branches; stem with yellowish bark, terete, glabrous. Leaves 12.5-20 by 3.8-6.3 cm., elliptic-lanceolate, acuminate, minutely puberulous when young, glabrous when mature, entire, dark green above, paler beneath, base tapering; main nerves 10-12 pairs with reticulate venation between; petioles 1.3-2.5 cm. long. Flowers in short dense axillary pedunculate spikes 2.5-7.5 cm. long, towards the ends of the branches; peduncles 3.8-10 cm., stout, shorter than the leaves; bracts reaching 2.2 by 1.3 cm., elliptic, subacute, glabrous or nearly so, 5-7-nerved, closely reticulately veined; bracteoles 20 by 4 mm., oblong-lanceolate, acute, with ciliolate margins, 1-nerved, reticulately veined. Calyx rather less than 1.3 cm. long, glabrous or slightly pubescent, divided to within 2 mm. of the base; segments imbricate, oblong-lanceolate, acute, 3-nerved, reticulately veined. Corolla white, with a few irregular rose-coloured bars in the throat, 3.2 cm. long, pubescent outside; tube 1.3 cm. long, the lower half cylindric, 4 mm. diam., the upper half much laterally

inflated; upper lip 2 by 1.3 cm. long, ovate-oblong, curved, obtuse, notched; lower lip as long as the upper, the lobes 1.3 cm. deep, oblong, rounded, the middle lobe the broadest. Filaments hairy at the very base, long, stout, curved; lower anther-cells minutely apiculate (not white-spurred) at the base. Ovary pubescent; lower part of style pubescent. Capsules 1.9-2.2 by 0.8 cm., clavate, subacute, shortly and bluntly pointed, pubescent; solid stalk flattened, 1 cm. long. Seeds 6 by 5 mm., orbicular-oblong, tubercular-verrucose, glabrous.

Distribution: Throughout India, often cultivated, Ceylon, Malay Peninsula.—Malaya.

The plant is pungent, bitter, acrid, cooling; causes "vata", useful in bronchitis, leprosy, blood impurities, heart troubles, thirst, asthma, fever, vomiting, loss of memory, leucoderma, consumption, jaundice, tumours, diseases of the mouth.—The root facilitates the expulsion of the fœtus; useful in strangury, and in leucorrhœa with blood discharges (Ayurveda).

The root is diuretic; useful in bronchitis, asthma, bilious vomiting, sore eyes, fevers, gonorrhœa.— The leaves are emmenagogue; useful in gonorrhœa.—The flowers improve the circulation of the blood; lessen strangury and jaundice.—The fruit is useful in bronchitis (Yunani).

The leaves and the root of this plant are considered a very efficacious remedy for all sorts of coughs, being administered along with ginger. The leaves are also used for rheumatism.

The leaves dried and made into cigarettes are smoked in asthma and their juice is used for diarrhœa and dysentery.

The flowers, leaves, and root, but especially the first, are supposed to possess antispasmodic qualities. They are bitterish and sub-aromatic and are administered in infusion and electuary as anthelmintic.

The flowers and the fruit are bitter, aromatic, and antispasmodic. The fresh flowers are used in ophthalmia.

The powdered root is used in Mysore by native doctors in cases of malarial fever. It has expectorant and antispasmodic properties, and its use has been recommended in the treatment of colds, coughs,

asthma, phthisis, and even diphtheria, in which it deserves more extended trial. It is said, also, to be a valuable antiseptic, anti-periodic, and anthelmintic.

In Bengal and Upper India, also the leaves are smoked as cheroots for asthma. In Assam, the juice of the plant is considered the best preparation. It is extracted from the young shoots and flowers by first washing them in an ordinary brass or iron vessel over a fire and then applying pressure. It is taken with ghi or honey.

The Burmese pound the leaves and use them as a poultice for fresh wounds, while an infusion of the leaves and twigs is given internally for coughs. In the Tenasserim district, the leaves are used externally in cases of swellings, bleeding of the nose, and headache; and internally for fever, colic, asthma and dysentery. It is prescribed in a spirit for wealthy persons suffering from certain humours. The spirit is prepared with this as a chief ingredient and several other articles, and it is said to strengthen the chest and throat. It has been known to cure bleeding of the lungs by taking a sweetened decoction of the plant, and the preparation is an excellent mixture for children and others with bad coughs and colds.

In Ceylon, the whole plant is used in the treatment of excessive phlegm; also in menorrhagia.

The plant, more particularly the leaf, is credited with antiseptic and parasiticidal properties.

The plant is recommended as a snake remedy (Charaka, Vaidyavinoda, Rasaratnakara). The fresh roots, bark, and leaves are bruised and applied to the wounds; the expressed juice or an aqueous extract of the fresh leaves is given internally; the fresh roots and bark are administered in the form of a decoction (Roberts). No part of the plant can be recommended for the treatment of snake-bite (Mhaskar and Caius).

The decoction of the roots was given in half a dozen cases with varying results. It did good in cases of chronic bronchitis, but had not the slightest effect in pulmonary tuberculosis; on the other hand, its use for a few days brought on an attack of hæmoptysis in a case of pulmonary tuberculosis (Koman).

1. The active principles are an alkaloid, vasicine, and an essential oil.—2. The alkaloid produces a slight fall of blood pressure followed by rise to the original level and increase in the amplitude of the beats and slowing of the rhythm.—3. The alkaloid has a slight but persistent broncho-dilator effect produced by depression of the terminus of the vagi. This effect is much more marked after atropine.—4. The fluid extract prepared from the leaves relieves cough, liquefies sputum which is coughed up more readily. It relieves bronchial spasm, and is a useful remedy in asthma especially in combination with belladonna.—5. The drug has no effect in tubercular affections of the lungs (Chopra and Ghosh; *Ind. Journ. Med. Research,* October 1925).

The constitution of vasicine has been the subject of much study (*Journ. Ind. Chem. Soc.;* 1925, 1927).

Almora: Basig—; *Beas:* Basuti—; *Bengal:* Bakas, Vasaka—; *Bombay:* Adalsa, Adarsa, Adulasa, Adulaso, Adulso, Arusa, Arusha, Bakus, Vasuka—; *Canarese:* Adsale, Adumuttada, Adusoge, Atarusha—; *Ceylon:* Adatodai, Pavettai—; *Deccan:* Aratora—; *Dehra Dun:* Bansa—; *French:* Carmantine, Noyer de Ceylan, Noyer des Indes—; *Gujerati:* Adsoge, Aduso, Ardusi—; *Hindi:* Adalsa, Adarsa, Adulasa, Adulaso, Arusa, Arusha, Bansa, Bashing, Rusa, Vasaka—; *Jhelum:* Bhekkar—; *Konkani:* Adolso—; *Kumaon:* Bashangarus, Basinga—; *La Reunion:* Noyer des Indes—; *Malayalam:* Attalotakam—; *Marathi:* Adulsa, Adulsi, Adusa, Baksa, Vasuka—; *Mundari:* Arandiba, Hereba, Lupuba—; *Naga:* Teeshæ—; *Nepal:* Alesi, Asuru, Kath—; *Oudh:* Rus—; *Persian:* Bansa—; *Punjab:* Bhekar—; *Salt Range:* Bekkar—; *Sanskrit:* Amalaka, Atarusha, Bashika, Bhishangmata, Kanthiravi, Kasanotpatana, Matrisinhi, Mrigendrani, Nasa, Panchamukhi, Raktappittaghni, Ramrupaka, Rasadani, Sinhamukhi, Sinhanana, Sinhaparni, Sinhapatri, Sinhasya, Sinhi, Sinhika, Sitakarni, Vaidyamata, Vaidyasinhi, Vaji, Vajidantaka, Vajidanti, Vasa, Vasaka, Vasha, Vasika, Vrisha—; *Sinhalese:* Agaladara, Warapala—; *Tamil:* Adadodi, Kattumurungai, Vachai—; *Telugu:* Addasaramu, Atarushamu—; *Trans-Indus:* Torabajja—; *Tulu:* Edumuttanditappu—; *Urdu:* Arusa—; *Uriya:* Basongo, Rottoomuli—.

Rhinacanthus Nees.

Shrubs laxly branched, sometimes subscandent. Leaves entire. Flowers solitary or in small cymes, sessile or nearly so, in dense or divaricate panicles; bracts and bracteoles small, shorter than the calyx. Calyx deeply 5-fid or 5-partite; segments narrow. Corolla 2-lipped; tube long, narrow, cylindric, scarcely enlarged above; upper lip linear-oblong, entire or shortly 2-lobed, twisted or recurved; lower lip broad, 3-lobed. Stamens 2, inserted on the throat of the corolla; anthers 2-celled, the cells superposed, muticous. Disk cupular. Ovary 2-celled; ovules 2 in each cell; style filiform; stigma minutely 2-fid. Capsule clavate, contracted below into a long cylindric stalk, 4-seeded. Seeds ovoid or suborbicular, compressed, glabrous, obscurely rugose or tuberculate.—Species 8.—Palæotropics.

R. nasuta Nees is used medicinally in China, Indo China, the Philippine Islands, and Madagascar; *R osnospermus* Bojer too is used in Madagascar.

1. **Rhinacanthus nasuta** (L.) Kurz in Journ. As. Soc. Beng. 39 (1870) II, 79.—*R. communis* Nees in Wall. Pl. As. Rar. III (1832) 109; Wight Ic. t. 464.—Plate 726B (under *R. communis* Nees).

An undershrub 0.9-1.5 m. high; stems subterete or obscurely angled, glabrous or pubescent. Leaves 5-10 by 2-5 cm. (occasionally larger), elliptic-lanceolate, acute, entire, lineolate, glabrous or nearly so, base tapering; main nerves 8-10 pairs; petioles 8-13 mm. long, often obscure. Flowers sessile or shortly pedicellate, solitary or 2 or 3 together, distant on the divaricate branches of very large lax terminal panicles; bracts and bracteoles 2 mm. long, ovate-lanceolate, glandular-pubescent. Calyx 4 mm. long, glandular-pubescent; segments 3 mm. long, subequal, linear, subacute. Corolla 2.5-3.2 cm. long, white, hairy outside; tube 1.6-2 by 0.15 cm.; upper lip 1 cm. long by 2 mm. broad at the base and about 1.2 mm. broad at top, bifid; lower lip 1.3 cm. long; lobes oblong, obtuse. Filaments glabrous; lower anther-cells muticous. Ovary glabrous; style pubescent. Capsules 1.9-2.2 cm. long, narrow, pointed, velvety-pubescent, not much swollen above the solid stalk which is more

than half the length of the capsule. Seeds 2.5 mm. diam., tuberculate, glabrous, black.

Distribution: Throughout India, Ceylon, Malay Peninsula.—Java, Madagascar, tropical Africa.

The root, leaves, and seeds are a useful remedy for ringworm and other cutaneous affections (Yunani).

The roots are believed in some parts of India to be an antidote to the bite of poisonous snakes.

In Sind, the plant is said to possess extraordinary aphrodisiacal powers, the roots boiled in milk being much employed for that purpose.

In Madagascar, the juice of the leaves, and the root bark are used in the treatment of herpes circinatus. The fresh root is considered a very valuable medicine in the treatment of inflammatory skin diseases. The root boiled in milk is said to be aphrodisiac.

The roots are *falsely* believed to be an antidote to the bites of poisonous snakes (Mhaskar and Caius).

Ashanti: Kwaaduko—; *Bengal:* Juipana—; *Bombay:* Gachkaran, Gajkarni, Nagamalli—; *Burma:* Anitia—; *Canarese:* Doddapatike, Nagamallige—; *Deccan:* Kabutarkajhar—; *Hindi:* Juipani, Palakjuhi, Palikjuhia—; *Malayalam:* Nagamulla, Pulukkolli, Pushpaketal—; *Marathi:* Gajakarni—; *Sanskrit:* Yuthikaparni—; *Sinhalese:* Anilta—; *Tamil:* Anichai, Kaligai, Nagamalli, Nagamalligai, Uragamalli—; *Telugu:* Nagamalle—; *Tulu:* Nagamallige—; *Urdu:* Palakjuhi—.

ECBOLIUM Kurz.

Glabrous or hairy shrubs. Leaves entire, rather thick. Flowers numerous, in terminal spikes; bracts large, imbricate; bracteoles small, linear or lanceolate. Calyx 5-partite; segments linear. Corolla-tube very long and narrowly linear (in the Indian species); upper lip entire or 2-fid; lower lip 3-lobed. Stamens 2, without rudiments of others; anther-cells 2, linear, not spurred nor appendaged at the base, of nearly equal height. Ovary glabrous or hairy, 2-celled; ovules 2 in each cell; style filiform; stigma very shortly equally 2-fid. Capsule much flattened, on a solid stalk,

2-seeded; placentæ not arising elastically from the base of the valves. Seeds (in the Indian species) large, much flattened, tubercular and scabrous, without hairs.—Species 12.—Africa, Madagascar, Arabia, India.

The root of *E. linneanum* Kurz. is used medicinally in Arabia and Tropical Africa.

1. **Ecbolium linneanum** Kruz. in Journ. As. Soc. XL (1871) pt. II, 75.—*Justicia Ecbolium* Linn. Sp. Pl. (1753) 15 (partim) Wight Ic. t. 463.—PLATE 727.

A low shrub, branches erect, cylindrical, thickened above the nodes, glabrous. Leaves large, 11.5-15 cm., oblong-oval or lanceolate, tapering to base, acuminate, acute, entire or very faintly crenate, glabrous, shining and dark green above, paler and densely finely pubescent beneath, petiole obscure. Flowers large, sessile, in opposite pairs, spikes nearly sessile, 5-25 cm., 4-sided, bracts 1.9-2.2 cm., oblong-oval, aristate, glandular-puberulous, ciliate, semi-membranous, reticulate-veined, bractlets subulate. Sepals linear acuminate, glandular-pubescent. Corolla-tube 3.8 cm., slightly dilated and laterally compressed at throat, deflexed-hairy outside, upper lip about 1.3 cm., very narrow, strongly reflexed, lower lip about 3.8 cm. diam., lateral lobes oblong, acute, middle one oval, obtuse. Capsule pubescent. Seeds white.

Distribution: Konkan, W. Ghats, S. M. Country, Deccan, Carnatic.

The roots are prescribed in jaundice and menorrhagia.

Canarese: Kappubobbuli, Kappukuruni—; *Hindi:* Udajati—; *Malayalam:* Karinkurinni, Kuranta—; *Marathi:* Dhaktaadulsa, Ranaboli—; *Tamil:* Nilambari—; *Telugu:* Chikatiquratappa, Nakkatoka, Pachavadambaramu—; *Uriya:* Pichokatho, Nobhomondolo—.

GRAPTOPHYLLUM Nees.

Glabrous shrubs. Leaves often variegated. Flowers pedicelled, clustered; clusters forming terminal thyrses; bracts and bracteoles very small, narrow. Calyx small, sub-5-partite; segments equal, linear-lanceolate. Corolla-tube curved; limb 2-lipped, upper lip

shortly 2-fid, lower 3-lobed. Stamens 2, 2 minute staminodes added; anthers oblong, 2-celled; cells parallel, muticous. Ovary 4-ovulate; style filiform, scarcely bifid. Capsule oblong, hard, contracted into a long stalk. Seeds usually 2, orbicular or subquadrate, compressed flat, lacunose-rugose.—Species 5.—Australia, Polynesia.

The genus is not therapeutically defined.

1. **Graptophyllum pictum** (L.) Griff. Notul. IV., 139.—*G. hortense* Nees in Wall. Pl. As. Rar. III (1832) 162.—*Justicia picta* Linn.; Roxb. Fl. Ind. I, 117.

A shrub 0.9-1.5 m. high with large elliptic or broadly elliptic subsessile leaves 7.5-20 cm. long, variegated with white. Flowers dark red, 3.8 cm. long in thyrses 5-10 cm. long..

Distribution: A native of Polynesia, common in Indian gardens.

The leaves are emollient and resolvent.

In the Konkan, the plant is put to the same medicinal uses as *Adhatoda vasica.*

The leaves made into a paste by grinding with the root of *Ceiba pentandra* are applied to the stings of scorpions.

The plant is not an antidote to scorpion-venom (Caius and Mhaskar).

Konkan: Kalaadulsa, Pandharaadulsa—; *Philippines:* Morado—; *Tagalog:* Antolang, Ataiatai, Balasbas, Balasbasmalomay, Moradong-maputi, Morandongmaputi, Sarasa, Ternate, Yovas—; *Visayan:* Balasbas, Pasao—.

RUNGIA Nees.

Erect or diffuse herbs or undershrubs. Leaves entire. Flowers in terminal or axillary perfectly or imperfectly 1-sided spikes; bracts in 2 or 4 rows, 2 of the rows often barren, the flowering bracts often with scarious margins; bracteoles narrower than the bracts. Calyx small, 5-partite; segments linear-lanceolate. Corolla 2-lipped, the lower lip longer than the upper. Stamens 2; anthers 2-celled, the cells often superposed, the lower cell often with a white basal appendage. Disk annular or shortly cupular. Ovary 2-celled; ovules

2 in each cell; style filiform; stigma minutely 2-fid. Capsule ovoid or oblong, shortly stipitate; placentæ, together with the retinacula, elastically separating from the base of the capsule after dehiscence, to scatter the seeds. Seeds normally 4, compressed, orbicular, glabrous, minutely tubercular or verrucose, often with concentric furrows.—Species 24.—Tropical Asia and Africa.

1. A procumbent rooting ramous weed .... 1. *R. repens.*
2. A much-branched annual straggling weed .... 2. *R. parviflora* var. *pectinata.*

The genus, though not clearly defined, seems to exhibit antipyretic properties.

1. **Rungia repens** Nees in Wall. Pl. As. Rar. III (1832) 110; Wight Ic. t. 465.—PLATE 728.

Stems usually decumbent, often rooting near the base, then erect, slender, subterete, glabrous or puberulous. Leaves 2.5-5 by 1.3-2 cm., subsessile or shortly petiolate, oblong-lanceolate, acute, lineolate on both sides, glabrous or nearly so, base usually tapering, less commonly rounded and unequal-sided; main-nerves about 6 pairs; petioles rarely reaching 4 mm. long. Flowers in erect terminal usually pubescent, imperfectly 1-sided spikes, 2.5-6.3 cm. long; bracts (including the scarious margin) 6 by 5 mm., broadly elliptic, pubescent (the herbaceous part inside the margin often lanceolate), cuspidate, much imbricate, the margins thinly scarious, ciliate, often 1.5 mm. wide; bracteoles 5 mm. long, linear-lanceolate, acute, with scarious margins, minutely pubescent. Calyx 4 mm. long, puberulous, divided to within 1 mm. of the base; segments lanceolate-subulate. Corolla white, blue, or pink, with darker spots, pubescent outside, nearly 1.3 cm. long; upper lip 3 mm. long, oblong, emarginate; lower lip 4 mm. long, shortly 3-lobed. Lower anther-cells with a white appendage at the base. Capsules 4-5 mm. long, ovoid-oblong, acute, compressed, with scarious faces and hard edges, pubescent. Seeds 1.5 mm. diam., suborbicular, rugose with concentric furrows, pale brown.

Distribution: Throughout the warmer parts of India, Ceylon.

The leaves resemble, both in smell and taste, those of thyme; while fresh, they are bruised, mixed with castor oil, and applied to the scalp in cases of tinea capitis.

The whole plant, dried and pulverised, is given in doses of from 4 to 12 drams in fevers and coughs, and is also considered a vermifuge.

The roots are ground with water and about half-a-teaspoonful poured into each nostril in stupor and coma following upon the bite of a snake. A decoction of the fresh roots and leaves is given internally (Roberts).

The roots and leaves are useless in the antidotal treatment of snake-bite. The roots are also useless as an errhine (Mhaskar and Caius).

Bombay: Ghatipitpapada—; *Gujerati:* Khatsalio, Khatselio, Khatshedio, Khatshelio—; *Hindi:* Kharmor—; *Marathi:* Ghatipitpapada—; *Sanskrit:* Parpatha—; *Sinhalese:* Salunayi—; *Tamil:* Kodagasalai—.

2. **Rungia parviflora** Nees in Wall. Pl. As. Rar. III (1832) 110; var. **pectinata** C. B. Clarke in Hook. f. Fl. Brit. Ind. IV, 550. —*R. pectinata* Nees; Wight Ic. t. 1547.—PLATE 729.

A much-branched annual straggling weed; stems subterete, glabrous or pubescent. Leaves very variable in size, 1.3-6.3 by 0.4-3.2 cm., elliptic-lanceolate or oblong-lanceolate, acute or subobtuse, lineolate, glabrous or nearly so, base acute; petioles 3-13 mm. long. Flowers in terminal and axillary 1-sided subsessile spikes 6-25 mm. long, sometimes 2 or 3 together at the ends of the branches; bracts dimorphic, the barren 4 by 1.5 mm., in 2 rows, lanceolate, cuspidate, pubescent, usually with scarious margins on both sides or sometimes on one side only, rarely not margined; fertile bracts 3 mm. diam. (including the broad scarious margin), hairy on both sides, orbicular, the central herbaceous portion lanceolate, cuspidate, the scarious margins often 1.2 mm. broad, usually 2-fid at the rounded apex; bracteoles 2.5 mm. long, elliptic-oblong, concave, with ciliate scarious margins which are 2-fid at the apex. Corolla blue, 5 mm. long, pubescent outside; upper lip 1.5 mm. long, broadly ovate, acutely

acuminate; lower lip 2.5 mm. long, obovate, shortly obtusely 3-lobed. Filaments glabrous; cells of the lower anthers with a long white appendage. Capsules 2.5 by 0.85 mm., ovoid, acute, compressed, pubescent at the tip, with scarious faces, 2- or 4- seeded. Seeds when 2 about 0.8 mm., when 4 hardly 0.5 mm. diam., orbicular, minutely echinulate, yellow.

Distribution: Throughout India, Ceylon, up to 4,000 ft. on the Kumaon Himalaya.

The juice of the small and somewhat fleshy leaves is considered cooling and aperient and is prescribed for children suffering from smallpox in dose of a tablespoonful or two twice daily. The bruised leaves are applied to contusions to relieve pain and diminish swelling.

Among the Santals, the root is given as a medicine in fevers (Campbell).

Gujerati: Mothokhadsalio—; *Porebunder:* Vadokhadsalio—; *Sanskrit:* Pindi—; *Santali:* Birlongoparak—; *Tamil:* Punakapundu, Tavasumurungi—; *Telugu:* Pindikunda—.

Dicliptera Juss.

Diffuse or suberect herbs. Leaves ovate or elliptic, acute entire or obscurely undulate. Flowers in axillary and terminal clusters or paniculate often umbel-like cymes, 1 or more enclosed within a pair of opposite involucral bracts, the flowers sessile within the bracts, one or more often reduced to a calyx and bracteoles; bracts exceeding the calyx, opposite, unequal, often connate at the base; bracteoles linear or linear-lanceolate, about equalling the calyx. Calyx deeply 5-partite; segments equal, linear-lanceolate, more or less pubescent. Corolla usually red, often spotted with purple; tube slender, slightly or not enlarged above; limb deeply 2-lipped, the upper lip entire or emarginate, the lower lip very shortly 3-lobed. Stamens 2; anthers 2-celled, usually superposed, rarely with basal appendages. Disk cupular. Ovary 2-celled; ovules 2 in each cell; style filiform; stigma shortly 2-fid. Capsules ellipsoid, ovoid or obovoid, subsessile or with a short solid stalk; placentæ separating elastically from the base of the capsule after dehiscence, to scatter the seeds. Seeds ovoid or

suborbicular, verrucose, echinulate, tuberculate, or papillose.—Species 100.—Tropics and subtropics.

D. chinensis Nees is used medicinally in China and Malaya.

1. **Dicliptera roxburghiana** Nees in Wall. Pl. As. Rar. III (1832) 111.—PLATE 726A.

A herb, 0.3-0.9 m. high. Stems nearly glabrous. Leaves up to 6.3 cm. long, elliptic, acute, obscurely pubescent or glabrate, petioles about 6 mm. long. Flowers in terminal and axillary, usually sessile clusters; bracts nearly 1.3 cm. long, cuneate-elliptic or obovate, not acuminate, pubescent and with ciliate margins. Corolla 2 cm. long. Capsule 6 mm. long, clavate, narrowed into a solid stalk, puberulous or glabrate. Seeds distinctly verrucose.

Distribution: Plains of Punjab and Bengal, Assam, Bhutan.

The plant is used as a tonic in the Punjab.

Punjab: Kirch, Semni—; *Simla:* Bouna—.

PERISTROPHE Nees.

Erect spreading herbs. Leaves entire. Flowers purple or rose-coloured, solitary or in small cymose heads, often arranged in large lax panicles; bracts in pairs, longer than the calyx, often unequal, linear or ovate; bracteoles in pairs, shorter than the bracts, linear or lanceolate. Calyx small, 5-partite; segments subequal, linear-lanceolate. Corolla 2-lipped; tube slender; upper lip subentire; lower lip shortly 3-lobed. Stamens 2; filaments pubescent below; anthers 2-celled, the cells one above the other, muticous. Disk cupular. Ovary 2-celled; ovules 2 in each cell; style filiform; stigma shortly 2-lobed. Capsule ellipsoid, with a cylindric stalk, 4-seeded; placentæ not arising elastically from the base of the capsule. Seeds discoid, glabrous, minutely glandular-papillose.—Species 15.—Palæotropics.

The genus is therapeutically inert.

1. **Peristrophe bicalyculata** Nees in Wall. Pl. As. Rar. III (1832) 113.—PLATE 730.

Herbaceous, 0.9-1.2 m. high; stems and branches usually 6-angled, more or less hairy, usually rough on the angles. Leaves

5-7.5 by 2.5-3.8 cm., ovate, acuminate, densely lineolate, more or less hairy above, somewhat densely so on the nerves and veins beneath, base usually rounded; main nerves 4-6 pairs; petioles 6-15 mm. long. Flowers in trichotomous cymes in large lax divaricate pubescent panicles; bracts beneath the calyx 2, opposite, often very unequal, the longer of the pair sometimes 1 cm., the shorter 6 mm. long, linear, acute, mucronate, with white membranous margins; bracteoles 4, similar to the bracts but shorter, subequal or sometimes unequal. Calyx 3-4 mm. long, divided to within about 1.2 mm. of the base; segments lanceolate-subulate with ciliolate margins. Corolla rosy, nearly 1.3 cm. long, pubescent outside; upper lip 6 by 3 mm., elliptic-oblong, obtuse, entire; lower lip slightly longer, oblong, with 3 acute lobes about 1 mm. deep. Filaments hairy; anther-cells one almost entirely above the other, muticous. Ovary pubescent at the tip; style nearly glabrous. Capsules 8 by 2.5 mm., narrowed into a cylindric stalk 2.5 mm. long, pointed, pubescent. Seeds 2.5-3 mm. diam., orbicular, papillose and slightly rugose.

Distribution: Throughout India.—Afghanistan, tropical Africa.

The whole plant macerated in an infusion of rice is said to be a good antidote for snake-pioson; but it is not (Mhaskar and Caius).

Bengal: Nasabhaga—; *Bombay:* Pitpatra—; *Gujerati:* Kaliadhedi, Kariadhedi, Lasiadhedi—; *Hausa:* Tubanin dawaki—; *Hindi:* Atrilal, Itrelal, Masi, Nasbhanga—; *Marathi:* Ghatipittapapada, Rankirayat—; *Merwara:* Kaliyandijharia—; *Mundari:* Huringmaracuta, Luputiammaracuta—; *Santal:* Bargekhodebaha—; *Sind:* Nazpat—; *Sinhalese:* Mahanelu—; *Telugu:* Chebira—.

VERBENACEAE.

Herbs, shrubs, or trees. Leaves usually opposite or whorled, simple or (in VITEX) digitate; stipules 0. Inflorescence cymose, racemose or spicate; cymes often compound or paniculate; bracts usually small; flowers often brightly coloured, hermaphrodite (rarely polygamous), usually irregular. Calyx inferior, gamosepalous, persistent, tubular or cup-shaped, 5-4-(rarely 6-8-) lobed or toothed. Corolla gamopetalous; tube usually cylindric or dilated above, often curved; limb 2-lipped or subequally lobed; lobes 5-4 (rarely more). Stamens 4, didynamous (rarely 2, very rarely 5-6), inserted on the corolla-tube; filaments free; anthers 2-celled, opening by longitudinal slits. Disk usually inconspicuous. Ovary superior, sessile 2-4-(rarely 8- or almost 1-) celled, entire or 4-lobed; ovules variously attached, 2 (sometimes 1) in each cell; style terminal; stigma usually entire, less commonly 2- or more- lobed. Fruit usually more or less drupaceous, 2-4- or 1- celled; mesocarp juicy, fleshy or dry; endocarp usually bony. Seed erect or pendulous, separate in distinct cells; albumen 0 in the Indian genera; embryo straight; radicle inferior. —Genera about 70. Species 750.—Almost all tropical and subtropical.

A. Inflorescence spicate, centripetal
- 1. Shrubs. Calyx small. Fruit a drupe .... LANTANA.
- 2. Small shrubs. Calyx small. Fruit capsular .... LIPPIA.
- 3. Herb. Calyx narrowly cylindric, 5-ribbed. Stamens 4 .... STACHYTARPHETA.
- 4. Herb. Calyx tubular, not accrescent .... VERBENA.

B. Inflorescence cymose, centrifugal. Cymes panicled. Drupe with 4 pyrenes
- 1. Flowers 4-merous. Drupe with 4 pyrenes .... CALLICARPA.
- 2. Flowers 4-6-merous. Drupe with 1-4-celled pyrene included in the accrescent calyx .... TECTONA.
- 3. Leaves entire or toothed. Flowers small .... PREMNA.
- 4. Leaves entire or toothed. Corolla 2.5 cm. .... GMELINA.
- 5. Leaves digitate .... VITEX.
- 6. Calyx in flower campanulate .... CLERODENDRON.

C. Cymes densely capitate. Calyx 5-partite, segments concave, much imbricate. Fruit capsular, somewhat fleshy, dehiscent
- Shrubs. Leaves entire. Flowers small .... AVICENNIA.

The few members which are endowed with medicinal properties are mostly bitter and more or less astringent.

OFFICIAL :—*Verbena officinalis* Linn.=*V. sororia* D. Don (Portugal).

LANTANA Linn.

Rambling pubescent or glabrous shrubs; branches 4-angled, sometimes prickly. Leaves usually simple, opposite, petiolate, crenate, often rugose. Flowers in pedunculate, capitate, ovoid or cylindric spikes; bracts ovate, conspicuous, longer than the calyx; bracteoles 0. Calyx small, membranous, truncate or obscurely toothed. Corolla-tube slender, cylindric; lobes 4-5, spreading. Stamens 4, didynamous, inserted about the middle of the tube, included; anthers broadly oblong. Ovary 2-celled; ovule solitary in each cell, erect from the base or attached laterally close to the base of each cell; style short; stigma oblique, subcapitate. Fruit drupaceous with a more or less fleshy mesocarp; endocarp hard, separating when ripe into two 1-celled 1-seeded pyrenes. Seeds exalbuminous; radicle inferior.—Species 60.—Tropics and subtropics.

1. Branches strigosely hairy .... 1. *L. indica.*
2. Branches usually more or less prickly, pubescent .... 2. *L. aculeata.*

Bechic, sudorific, and intestinal antiseptic.

The following species are used medicinally in the West Indies—*L. aculeata* Linn.—; in Brazil— *L. aculeata* Linn., *L. brasiliensis* Link., *L. involucrata* Linn., *L. microphylla* Mart., *L. sellowiana* Link. and Otto—; in Guiana—*L. aculeata* Linn., *L. involucrata* Linn.—; in La Reunion—*L. aculeata* Linn.—; in the Gold Coast—*L. salvifolia* Jacq.—; in Guinea—*L. alba* Mill., *L. rosea* Rafin.—; in South Africa—*L. salvifolia* Jacq.—.

1. **Lantana indica** Roxb. Hort. Beng. (1814) 46; Wight Ic. t. 1464.

A shrub 0.9-2.4 m. high; branches quadrangular, strigosely hairy, yellowish brown. Leaves 3.8-6.3 by 2.5-3.8 cm., opposite or in whorls of 3, ovate, acute or subobtuse, crenate-serrate, rugose and finely pubescent above, softly white-pubescent or subvillous beneath,

rounded but usually suddenly narrowed at the base; petioles 6-10 mm. long. Flowers odourless, sessile, in axillary pedunculate ovoid heads 1.3-2 cm. long, lengthening out into short spikes and elongating in fruit; peduncles 2.5-8.3 cm. long, usually in opposite axils, 4-sided, slender, hairy, somewhat thickened upwards; bracts reaching 1 cm. long, ovate, acuminate, softly hairy on both sides, smaller upwards. Calyx 1.5 mm. long, truncate, membranous, very hairy. Corolla light purple with a yellowish tube, hairy outside; tube 6 mm. long, cylindric, often slightly swollen over the stamens; limb 8 mm. across; lobes 4, rounded, spreading. Filaments very short, slender. Ovary glabrous; style short, about 0.8 mm. long. Drupe 4 mm. diam., purple.

Distribution: Throughout India, Ceylon, Baluchistan.—Tropical Africa.

The leaves are regarded as a cure for snake-bite; but *erroneously* so (Mhaskar and Caius).

Canarese: Joli, Kadujoli, Natahu, Parale—; *English:* Indian Lantana, Wild Sage—; *Gujerati:* Ghanidalia—; *Malayalam:* Arippu, Konninimullu—; *Marathi:* Ghaneri—; *Porebunder:* Ghanidario—; *Tamil:* Makkadambu, Unni—; *Tulu:* Natapu—.

2. **Lantana aculeata** Linn. Sp. Pl. (1753) 627.—*L. Camara* Linn. l. c.

A large scrambling evergreen shrub, 1.2-2.4 m. high; twigs usually more or less prickly, pubescent, prickles when present hooked. Leaves opposite, 2.5-7.5 by 1.5-4.3 cm., ovate, subacute, base truncate or narrowed, crenate-serrate, scabrid on both sides; petiole 5-13 mm. long. Flowers 6 mm. across, usually orange, in heads which are permanently capitate, 2.5 cm. across, peduncles 2.5-7.5 cm. long, hispid, thickened upwards; bracts 6 mm. long, lanceolate, hispid. Calyx about 2 mm. long. Corolla-tube 7.5-13 mm. long, slender, pubescent; lobes 4, rounded. Fruit 5 mm. diam., black, shining.

Distribution: A native of tropical America and completely naturalized in many parts of India.

In Guiana and La Reunion, the plant is considered vulnerary, diaphoretic, carminative, antispasmodic. A decoction is given in

tetanus, rheumatism, malaria. It is a powerful tonic, much used in atoxy of the abdominal viscera.

An oil from the flowers and leaves was extracted and studied by Kanga (*Journ. Ind. Inst. Sc.*, Vol. I). The enzymes of the leaf were identified and studied by Edal Behram (*Journ. Ind. Inst. Sc.*, Vol. II), the pigments by Sathe and Subrahmanyam (16th Ind. Sc. Congress; Madras, 1929).

Akim: Ananse dua—; *Akwapim:* Ananse dorkono—; *Awuna:* Adelamanyi—; *Bombay:* Ghaneri—; *Brazil:* Camara, Camara juba, Cambara—; *Canarese:* Aripu, Hesike, Kakke, Kasutibu, Natahu—; *English:* Lantana Weed, Wild Sage—; *French:* Bois de sauge, Herbe à plomb, Lantana—; *French Guiana:* Marie crabe, Marie crabe épineux—; *Ga:* Ananu Kongmi—; *Krobo:* Akotongmai—; *La Reunion:* Corbeille d'or, Galaber—; *Malayalam:* Arippu—; *Marathi:* Chadurang, Ghaneri—; *Philippines:* Coronitas—; *Sinhalese:* Katuhinguru—; *Telugu:* Pulikampa—; *Tulu:* Natapu—; *Visayan:* Bohoboho—.

LIPPIA Houst. ex Linn.

Shrubs or undershrubs, rarely herbs; the only Bombay species a prostrate herb with stems widely creeping and rooting at the nodes. Leaves small, opposite, serrate. Flowers small, in dense long-stalked, axillary heads; bracts small; bracteoles 0. Calyx small, membranous, 2-4-lobed, ultimately 2-valved, enclosing or sometimes adhering to the fruit. Corolla-tube cylindric, straight or curved; limb oblique, more or less 2-lipped; upper lip 2-fid, emarginate or 2-lobed; lower lip 3-lobed. Stamens 4, didynamous, included; anthers ovate with parallel cells. Ovary 2-celled; ovule solitary in each cell, erect from the base or laterally attached near the base of the cell; style short; stigma oblique, subcapitate. Fruit small, with a hard dry epicarp, enclosed in the slightly accrescent calyx; endocarp hard and bony, easily separable into two 1-seeded pyrenes. Seeds exalbuminous; radicle inferior.—Species 120.—Chiefly tropical America and Africa.

The leaves are antispasmodic, expectorant, laxative and febrifuge.

The following are used medicinally in Spain—*L. citriodora*

Kunt.—; in the Gold Coast and Senegal—*L. adœnsis* Hochst. in Guinea—*L. adœnsis* Hochst., *L. citriodora* Kunt.—; in South Africa —*L. asperifolia* Rich., *L. scaberrima* Sond.—; in La Reunion—*L. nodiflora* Rich.—; in China and the Philippine Islands—*L. nodiflora* Rich.—; in Brazil—*L. citrata* Schlecht., *L. pseudothea* Schan.—; in Guiana—*L. citriodora* Kunt.—.

1. **Lippia nodiflora** Mich. Fl. Bor. Amer. II (1803) 15.—PLATE 731.

A creeping perennial herb; stems rooting at the nodes, much-branched, subquadrangular, more or less clothed with appressed, medifixed, white hairs, sometimes nearly glabrous. Leaves opposite, subsessile, 2-3.2 by 1-2 cm., spathulate, cuneate at the base, rounded at the apex, deeply and sharply serrate in the upper part, appressedly hairy on both sides with medifixed white hairs. Flowers sessile, densely packed in long-pedunculate axillary heads which are at first globose, afterwards elongate and becoming spicate and oblong in fruit; peduncles 2.5-7.5 cm. long, usually from the axil of one only of each pair of leaves; bracts 2.5 mm. long, broadly elliptic or obovate with a somewhat cuneate base, mucronate, glabrous. Calyx 2 mm. long, membranous, deeply 2-lobed, compressed, mitre-shaped, pubescent on the back with basifixed hairs, closely covering the fruit, the 2 acuminate lobes projecting beyond it. Corolla 2.5-3 mm. long, white or pale pink, pushed off as a calyptra by the ripening fruit, 2-lipped; upper lip erect, bifid; lower lip 3-lobed, the middle lobe the largest. Fruit 1.5 mm. long, globose-oblong, dry, splitting into two 1-seeded plano-convex glabrous pyrenes.

Distribution: Throughout India, Ceylon, Baluchistan.—Africa and most tropical and subtropical regions.

The plant is acrid; cooling, aphrodisiac, astringent to the bowels, stomachic, vulnerary, anthelmintic, alexiteric; useful in diseases of the heart, the blood, the eye; improves taste; good for ulcers, wounds, burning sensation, asthma, bronchitis, thirst, loss of consciousness (Ayurveda).

The plant is hot and dry; diuretic, maturant; useful in fevers and colds, in urinary concretions (Yunani).

The tender stalks and leaves are slightly bitter, and prescribed in the form of an infusion to children suffering from indigestion, and to women after delivery.

A poultice composed of the fresh plant is a good maturant for boils.

Honigberger considered it valuable in ischury, stoppage of the bowels and pain in the knee-joint. It is used in Bombay as a demulcent in cases of gonorrhœa.

In La Reunion, the plant is used as a diuretic.

Chutney made from the leaves and fruits is eaten to relieve the irritation of internal piles. A fumigation by the compression of the entire plant between two red hot bricks is said to give relief in inflamed and bleeding piles. The chutney and the fumigation on trial were found to give only temporary relief in such cases (Koman).

Bombay: Ratolia—; *Chinese:* Shih Hsien—; *Deccan:* Tan—; *Gujerati:* Ratoliya, Ratuliyo—; *Hindi:* Bhuiokra, Jalapapili, Ludra—; *La Reunion:* Fraise de mer, Verveine, Verveine du pays, Verveine sauvage—; *Malayalam:* Kattuttippali—; *Marathi:* Jalapimpali, Ratoliya—; *North-Western Provinces:* Ludra—; *Porebunder:* Ratavelio—; *Punjab:* Bakan, Bukan, Jalnim, Mokna—; *Sanskrit:* Agnijvala, Bahushikha, Chitrapatri, Jalapippali, Langali, Maharashtri, Matsyagandha, Pranada, Shakuladani, Sharadi, Toyavallari, Trinashita, Vashira—; *Sind:* Wakan, Wakem—; *Sinhalese:* Herimanadatta, Herimenakola—; *Tagalog:* Chachachachahan, Tsatsatsatsahan—; *Tamil:* Podutalei—; *Telugu:* Bokenaku, Bokkena—; *Uriya:* Bukkan—; *Visayan:* Corocarcudan, Siricpuyo—.

VERBENA Linn.

Pubescent herbs or undershrubs. Leaves opposite or ternately whorled, toothed or pinnatifid. Spikes terminal, simple or corymbose; bracts and flowers small. Calyx tubular, shortly 5-toothed. Corolla tubular; limb more or less oblique, sub-2-lipped, 5-lobed. Stamens 4, didynamous, included; anthers ovate, 2-celled, cells subparallel. Ovary 1-celled, more or less 4-lobed (sometimes even at flower-time 4-celled), 4-ovuled; style short, obscurely 2-lobed; ovules attached

laterally near the base of the cell. Fruit included in the calyx; pyrenes 4 or fewer, oblong.—Species 100.—Tropical and temperate.

Antirheumatic, febrifuge, and slightly astringent.

The following are used medicinally in Europe—*V. officinalis* Linn., *V. supina* Linn.—; in China, Indo China, and Malaya—*V. officinalis* Linn.—; in North America—*V. hastata* Linn.—; in South Africa—*V. venosa* Gill. and Hook.—.

OFFICIAL :—The flowered plant of *V. officinalis* Linn.=*V. sororia* D. Don in Portugal.

1. **Verbena officinalis** Linn. Sp. Pl. (1753) 20.—PLATE 732B.

An erect more or less pubescent perennial herb. Stems 0.3-0.9 m. high, decumbent at the base, branched, 4-sided, puberulous. Leaves 5-10 cm. long, variously lobed, narrowed to the base; lower ones stalked, pinnatifid or coarsely toothed, more or less pubescent and usually hoary on the nerves beneath; upper sessile, usually 3-partite. Flowers 6 mm. long, sessile in dense bracteate heads which elongate as the fruit ripens into slender spikes up to 25 cm. long; bracts ovate, acute. Calyx twice as long as the bracts and half as long as the corolla-tube, minutely 5-toothed, glandular-hairy. Corolla blue or lilac, hairy; limb spreading, about 4 mm. diam., lobes subquadrate, throat hairy. Fruit dry, pyrenes ribbed.

Distribution: Plains of Punjab and Bengal, and up to 7,000 ft. on the Himalaya from Kashmir eastwards.—All temperate and subtropical regions.

The plant is tonic and astringent, useful in paralysis and amenorrhœa; the leaves promote the healing of wounds (Yunani).

The fresh leaves are used as febrifuge and tonic, and as rubefacient in rheumatism and diseases of the joints; the plant is used in Lahore as a depurative and febrifuge.

The root is believed to be a remedy for scrofula and snake-bite.

In many parts of Europe, the herb is still employed with advantage in the early stages of fevers, colds, etc., and in the treatment of fits, convulsions and nervous disorders. In Tuscany, it is used as a poultice for liver complaints, and taken internally for the same disease and for dropsy.

Fruit a small globose drupe; pyrenes 4, or fewer by suppression, 1-seeded.—Species 40.—Tropics and subtropics.

A. Trees
  1. Leaves ovate to narrowly oblong, acute, entire or nearly so .... 1. *C. arborea.*
  2. Leaves ovate or ovate-lanceolate, subentire .... 2. *C. lanata.*
B. Shrubs
  1. Leaves ovate or ovate-lanceolate closely crenate .... 3. *C. macrophylla.*
  2. Leaves broadly elliptic, shortly acuminate at both ends, sharply crenate-serrate .... 4. *C. cana.*

C. lanata Linn. is used medicinally in Java and Malaya.

C. cana Linn. enters into the composition of ipohs prepared by the Malays.

1. **Callicarpa arborea** Roxb. Hort. Beng. (1814) 10.—PLATE 732A.

A small tree, up to 12 m. high; trunk stout, with grey soft bark. Leaves coriaceous, 15-20 cm. long, ovate to narrowly oblong, acute, usually quite entire, base cuneate; upper surface glabrate when mature, densely clothed beneath with persistent tomentum covering numerous glands; petioles 2.5-5 cm. long. Peduncles as long as the petioles, closely tomentose. Calyx 1.2 mm. long, subtruncate, stellately pubescent. Corolla 4 mm. long, pale purple. Drupes 2.5 mm. diam., purple, turning black when ripe.

Distribution: Upper Gangetic Plain, lower hills of Kumaon to Sikkim, Assam, Khasia Hills, Bengal, Burma.—Sumatra.

The bark is aromatic and bitter, and is applied in decoction in cutaneous diseases. It is considered tonic and carminative.

Assam: Khoja—; *Bengal:* Bormala, Kojo—; *Burma:* Daungsatpya, Doungsappya, Sigye—; *Cutch:* Ghivala—; *Garo:* Makanchi—; *Kharwar:* Bogodi, Gogdi—; *Khond:* Subornniborodo—; *Kolami:* Bundun—; *Kumaon:* Dera, Ghiwala, Kumhar, Shiwali—; *Lepcha:* Sunga—; *Magahi:* Turmong—; *Malay:* Ambong ambong bukit, Kata Kran—; *Michi:* Kodo, Kozo—; *Mundari:* Bodud, Bomud, Bundud—; *Nepal:* Gœhlo, Guengyhlo—; *Rajbanshi:* Doika—; *Santali:* Dumkotoka—; *Uriya:* Bornnopotri, Dhaugombhari, Gerugombhari, Sanogombhari—.

2. **Callicarpa lanata** Linn. Mant. II (1771) 331.—*C. Wallichiana* Walp.; Wight Ic. t. 1480.—PLATE 733.

A tall shrub or sometimes a small tree; bark grey, rough and corky; young branches stout, cylindric, closely covered with a thick easily detachable felt of grey or fulvous stellate hairs. Leaves crowded towards the ends of the branches, 15-23 by 7.5-10 cm., ovate or elliptic-lanceolate, acuminate, entire or toothed, dark green, rugose, glabrous and shining above, with dense stellate tomentum beneath; base rounded, cordate or acute; main nerves 6-9 pairs, impressed above, very prominent beneath, with conspicuous reticulate venation between; petioles 2.5-4.5 cm. long, stout, densely tomentose. Flowers sessile, in divaricately branched shortly pedunculate densely stellately tomentose axillary cymes; bracts scarcely 1.2 mm. long, linear. Calyx 2.5 mm. long, campanulate, very faintly 4-lobed, densely stellately tomentose. Corolla 4 mm. long, reddish purple, glabrous; tube 2.5 mm. long; lobes 4, subequal, subquadrate, rounded. Stamens much exserted; filaments slender, glabrous; anthers cream-coloured, the cells parallel. Ovary and style glabrous. Drupe scarcely 4 mm. diam., globose, black, smooth, shining.

Distribution: Konkan, S. M. Country, N. Kanara, W. Ghats of Bombay and Madras Presidencies.

Both leaves and bark are faintly aromatic and bitterish, and afford much mucilage when boiled. The leaves boiled in milk are used as a wash for aphthæ of the mouth, and the bark and root boiled in water yield a decoction which is used to lessen febrile heat and remove hepatic obstruction and hepatic eruptions.

The root is employed in Upper India in cutaneous affections.

This plant is reckoned by the Javanese amongst their emollients. The bark possesses a peculiar sub-aromatic and slightly bitterish taste and may probably be found to have other medicinal virtues. The Malays consider the plant as a diuretic.

Bengal: Massandari—; *Bombay:* Aisar—; *Canarese:* Ardri, Ibbanne, Ruchipatri—; *Hindi:* Bastra—; *Kadir:* Puru—; *Malayalam:* Nallapompil, Pichenkala, Temperuvallam, Tonti, Tontitterakam, Uennattekka—; *Sinhalese:* Illa—; *Tamil:* Kattukkumil, Vettilaippattai—.

3. **Callicarpa macrophylla** Vahl Symb. III, 13, t. 53.—PLATE 734.

An erect shrub, 1.2-2.4 m. high; branches virgate, usually shaggy as well as the tomentose tips. Leaves 12.5-23 cm. long, ovate or ovate-lanceolate, acuminate, base cuneate or rounded; upper surface wrinkled, glabrate when mature, white-tomentose beneath with compound stellate hairs; main lateral nerves 12-16 pairs; petiole 6-13 mm. long. Flowers hardly 5 mm. long, crowded in axillary peduncled globose cymes 2.5-7.5 cm. across; peduncles shorter than the petioles. Calyx less than 1.2 mm. long, stellate-hairy; lobes minute, triangular. Corolla rose-coloured; lobes subequal, spreading. Drupes white.

Distribution: Upper Gangetic Plain, Bengal Plain, W. Himalaya from Kashmir eastwards up to 6,000 ft., Assam, Pegu.

An aromatic oil from the root is used as a remedy in disorders of the stomach (Trimen).

In Hazara, the leaves are heated and applied to rheumatic joints (Stewart).

Bengal: Mathara, Mattranja—; *Chenab:* Sumali—; *Dehra Dun:* Daia—; *Garhwal:* Daia—; *Hindi:* Daya—; *Jhelum:* Bapattra, Bauna, Pattharman—; *Kumaon:* Daya, Shiwali—; *Malayalam:* Chimpompil—; *Mundari:* Bundud, Pupundidaru—; *Ravi:* Denthar, Druss—.

4. **Callicarpa cana** Linn. Mant. 198.

A shrub about 1.2 m. tall; branches, leaves beneath and inflorescence whitish grey tomentose. Leaves membranous, ovate to lanceolate, short-acuminate, base cuneate, serrulate, 10-18 cm. long, 5-7.5 cm. wide; petioles 6-20 mm. long. Cymes 20 mm. long with a very short peduncle (about 6 mm. long) about 2.5 cm. across. Flowers numerous. Calyx tomentose. Corolla campanulate, nearly glabrous, lilac, 1.75 mm. long. Drupe globose, purple.

Distribution: Malay Peninsula.—Malay Islands to Australia.

The leaves, roots, and bark are used for skin diseases.

Chittagong: Arusha—; *Philippines:* Tambalabase—.

STACHYTARPHETA Vahl.

Herbs or shrubs, hairy or glabrous. Leaves opposite or alternate, toothed, usually rugose. Spikes terminal, long and slender (in the Indian species); flowers solitary in the axils of bracts, sessile or half immersed in the rhachis of the spike; bracts lanceolate, long or short; bracteoles 0. Calyx elongate, narrowly cylindric, shortly 4-5-toothed, often variously slit in a late stage. Corolla-tube slender, cylindric; limb oblique, with 5 equal or unequal flat spreading lobes. Perfect stamens 2 (the lower pair), included in the corolla-tube; staminodes 2, minute or 0; filaments short; anthers without appendages, the cells vertical, divaricate. Ovary 2-celled; ovule solitary in each cell, attached laterally near the base of the cell; style long, filiform. Fruit enclosed in the calyx, linear-oblong, separating into 2 hard 1-seeded pyrenes.—Species 45.—America.

S. indica Vahl is used medicinally in the Gold Coast, La Reunion, Brazil, and the West Indies; *S. dichotoma* Vahl too is used in the West Indies.

1. **Stachytarpheta indica** Vahl Enum. I (1805) 206.—*Verbena jamaicensis* Linn. Sp. Pl. 19.

Annual, 0.3-0.9 m. high; stems erect, dichotomously branched, nearly glabrous; young branches nearly quadrangular. Leaves 5-10 by 2.5-3.8 cm., elliptic, obtuse or acute, coarsely serrate, glabrous or nearly so, base much tapering and decurrent into the petioles which are consequently obscure. Flowers sessile, in long, slender, nearly continuous glabrous spikes reaching 30 cm. long, the rhachis hollowed out beneath each flower; bracts 5 mm. long, lanceolate-subulate, scariously margined near the base. Calyx 6 mm. long, membranous, tubular, glabrous; teeth 4, short, acute. Corolla deep blue, glabrous; tube 1 cm. long, slightly curved, hairy inside; limb about 1 cm. across, 5-lobed. Filaments slender, hairy below. Ovary glabrous; style long, filiform, glabrous. Fruit 3-4 mm. long, oblong, ribbed, splitting into 2 pyrenes.

Distribution: **India, Ceylon.—Tropical Asia, America, Africa. Sometimes cultivated.**

In Brazil, it is used externally for purulent ulcers, and given internally for fevers and rheumatic inflammations.

In Guiana, it is much used in the treatment of dysentery.

In La Reunion, the leaves are used as a maturant.

In the Gold Coast, the leaves are crushed, and the juice is used in the cure of eye troubles, such as cataract, and for open sores in children's ears. They are also said to cure heart trouble.

Betsimisaraka: Hobimboalavo, Hohimboalavo—; *Brazil*: Jarbao, Orgibao, Urgevao—; *Canarese:* Kariyuttarani—; *Ceylon:* Naioringi—; *English:* Aaron's Rod—; *Fanti:* Ankasa—; *French Guiana:* Crête d' Inde, Crête dinde, Verveine—; *La Reunion:* Herbe à chenilles, Queue de rat—; *Madras:* Simainayuruvi—; *Malayalam:* Katapunuttu—; *Mundari:* Marangcirciti—; *Sinhalese:* Balanakutta—; *Tamil:* Simainaivirunji—; *Twi:* Nsunsu, Tabonsu, Tanagya—; *Wassaw:* Abonternnua, Tuetu—.

TECTONA Linn. f.

Trees stellately tomentose. Leaves opposite or whorled, large, petiolate, entire. Flowers small, numerous, in dichotomous cymes arranged in large terminal panicles; bracts small, narrow. Calyx campanulate, shortly 5-6-lobed, enlarged and becoming bladder-like in fruit, ovoid or urceolate. Corolla white; tube short; limb with 5-6 short subequal spreading imbricate lobes. Stamens 5-6, inserted near the base of the corolla, equal, exserted; anthers ovate or oblong with distinct parallel cells. Ovary fleshy, 4-celled; ovule solitary in each cell; style linear; stigma shortly 2-fid. Fruit a drupe enclosed in the enlarged calyx; endocarp thick, bony, 4-celled. Seeds erect, oblong; albumen 0.—Species 3.—Indo-Malaya.

T. grandis Linn. is used medicinally in the Philippine Islands.

1. **Tectona grandis** Linn. f. Suppl. (1781) 151; Roxb. Corom. Pl. t. 6.—PLATE 735.

A large deciduous tree; branchlets quadrangular, channelled, stellately tomentose. Leaves 30-60 by 15-30 cm. (in seedlings often much larger), elliptic or obovate, acute or acuminate, the upper surface rough but usually glabrous, the lower clothed with dense

stellate grey or tawny tomentum, entire, base usually cuneate; main nerves 8-10 pairs with 2 or 3 large branches near the edge of the leaf, joined by numerous parallel transverse veins. Flowers shortly pedicellate, in large erect terminal branched tomentose cymose panicles 0.3-0.9 m. long, with lanceolate bracts at the forks; bracts beneath the calyx 2.5 mm. long, linear-lanceolate. Calyx in flower 3 mm. long, stellately tomentose, semiglobose-campanulate, the lobes 5 or 6, spreading, subequal, 1.2 mm. long; in fruit enlarged to 2.5 cm. or even more long, bladder-like, enclosing the fruit, ovoid, more or less crumpled or irregularly plaited, reticulately veined. Corolla white, glabrous, 5-6-lobed; tube about 2 mm. long; limb 6 mm. across when expanded, with spreading subequal lobes. Fruit 1.3 cm. diam., subglobose, somewhat 4-lobed, the pericarp soft with dense felted stellate hairs; endocarp bony.

Distribution: Konkan, W. Ghats of Bombay and Madras Presidencies, Circars, Deccan, Carnatic, Central India, Burma, Malay Peninsula.—Sumatra, Java.

The roots are given in anuria and retention of urine.—The flowers are acrid, bitter, dry; increase "vata"; useful in bronchitis, biliousness, urinary discharges.—The bark is sweet, acrid; useful in bronchitis.—The wood is acrid, cooling; laxative; sedative to the gravid uterus; useful in biliousness, piles, leucoderma, dysentery (Ayurveda).

The oil from the flowers promotes the growth of hair; useful in scabies.—The wood has a bad taste and bad flavour; good for headache, biliousness, and burning pain over the region of the liver; allays thirst; anthelmintic, expectorant; the ashes are applied to inflamed eyelids (Yunani).

A plaster of the powdered wood is recommended in hot headaches and for the dispersion of inflammatory swellings; when taken internally it is said to be beneficial in dyspepsia, with burning of stomach. It also acts as a vermifuge. The ashes of the wood are applied to swollen eyelids and are said to strengthen the sight. The bark is an astringent, and the oil of the nuts promotes the growth of hair and removes itchiness of the skin. The flowers and the seeds are diuretic.

In the Konkan, the tar is used as an application to prevent maggots breeding in sores on draught cattle.

The wood rubbed down with water into a paste allays the pain and inflammation caused by handling the Burmese black varnish Thitsi (*Melanorrhœa usitatissima*).

In Burma, the oil from the wood is used medicinally as a substitute for linseed oil.

The ashes, in combination with other drugs, are given in snake-bite; but they are not an antidote to snake-venom (Mhaskar and Caius).

Arabic: Saj—; *Assam:* Chingjagu—; *Bengal:* Segun—; *Berar:* Sigwan—; *Bhil:* Sag—; *Bombay:* Sag, Sagwan, Sal, Tegu, Tekku—; *Burma:* Kyun, Kywon—; *Canarese:* Jadi, Saguvani, Tega, Tegina, Tegu, Tyaga—; *Central Provinces:* Khaka, Sag, Sagon, Sigwan, Teak, Teka—; *Deccan:* Sagvan—; *English:* Indian Oak, Ship Tree, Teak—; *French:* Arbre puant, Arbre de Teck, Chêne des Grandes Iles, Teck, Tek—; *Gond:* Teka—; *Gujerati:* Sag, Saga, Sagach—; *Hindi:* Sagon, Sagun, Sagwan, Sakhu, Segun—; *Konkani:* Sailo—; *Lambadi:* Sagonaro—; *Lepcha:* Ripnyok—; *Malayalam:* Tekka—; *Marathi:* Sag, Saga, Sagvan, Sagwan—; *Melghat:* Sipna—; *North-Western Provinces:* Sagun—; *Persian:* Saj, Sal—; *Philippines:* Teca—; *Portuguese:* Teca—; *Punjab:* Sagun, Sagwan—; *Rajputana:* Saguan—; *Sanskrit:* Anila, Arjunopama, Arna, Atipatraka, Bhumiruha, Dhrubasadhana, Dirghachhada, Dvaradaru, Gandhasara, Grihadruma, Halimaka, Kharachhada, Kharapatra, Kolaphala, Krakachapatra, Mahapatra, Mahiruha, Nau, Sabarasara, Saka, Shaka, Shakakhya, Shakataru, Sharapatra, Shreshthakashtha, Sthirasara, Tailapila, Teka, Yogi—; *Santali:* Saguna—; *Sind:* Loheru—; *Sinhalese:* Tekka—; *Tagalog:* Tida—; *Tamil:* Kalindi, Kumidigam, Sadi, Sagam, Sarasam, Tekku—; *Telugu:* Peddateku, Teku—; *Tulu:* Tekki—; *Urdu:* Sagun—; *Uriya:* Saguan, Saguni, Teko—; *Visayan:* Calayate, Dalanan, Dalandon, Dalondon, Sagunyate, Yate—.

PREMNA Linn.

Trees or shrubs sometimes climbing. Leaves opposite, entire or toothed. Flowers in corymbose or paniculate sometimes thyrsoid

pubescent cymes; bracts small, narrow; bracteoles 0. Calyx small, cup-shaped; limb truncate or minutely 2-5-toothed or 2-lipped. Corolla small; tube short; throat hairy inside; limb 2-lipped, 5-lobed or subequally 4-lobed. Stamens 4, didynamous, inserted below the throat of the corolla, rarely exserted; anthers ovate or rounded, the cells parallel or divergent. Ovary 2- or 4- celled; ovules 4; style linear; stigma shortly 2-fid. Fruit a small drupe, embraced below by the calyx, globose or oblong-obovoid; endocarp hard, undivided, normally 4- or by abortion 1-3- celled, with a central cavity. Seeds oblong; albumen 0.—Species 45.—Tropics and subtropics of the Old World.

A. Calyx 2-lipped, one lip 2-toothed the other subentire ...... 1. *P. integrifolia.*
B. Calyx 5-4-toothed, subequally or obscurely 2-lipped
  I. Leaves entire or nearly so
    a. Leaves ovate, acuminate, entire .... 2. *P. tomentosa.*
    b. Leaves cordate-ovate, shortly acuminate .... 3. *P. latifolia.*
  II. Leaves toothed
    a Leaves short-petioled, obovate or elliptic-acuminate, sharply serrate .... 4. *P. esculenta.*
    b. Leaves sessile, obovate, coarsely serrate .... 5. *P. herbacea.*

The root is bitter, stomachic, and tonic; the leaves are laxative and diuretic.

The following are used medicinally in China—*P. microphylla* Turcz.—; in the Gold Coast—*P. quadrifolia* Schum. and Thonn.—; in the Fiji Islands—*P. taitensis* Schan.—; in La Reunion—*P. integrifolia* Linn.—.

1. **Premna integrifolia** Linn Mant. II (1771) 252; Wight Ic. t. 1469.—*P. serratifolia* Linn. l. c. 253.—Plate 736.

A large shrub or small tree reaching 9 m. high; bark yellowish, lenticellate; young parts glabrous or slightly pubescent; trunk and large branches sometimes spinous. Leaves 5-9 by 3.2-6.3 cm., broadly elliptic, obtuse, very shortly acuminate, glabrous, entire or the upper part dentate, base rounded or subacute; main nerves 4-5 pairs; petioles 1-1.6 cm. long. Flowers small, greenish yellow, with a disagreeable odour, in terminal pubescent paniculate corymbose cymes; bracts minute, lanceolate. Calyx 2.5 mm long, thick, glabrous, 2-lipped, one lip 2-toothed, the other subentire (so that the

calyx appears 3-lobed). Corolla glabrous outside; tube 3 by 2 mm., cylindric, hairy in the throat inside; lobes 4, oblong, rounded, 1.2 mm. long. Stamens slightly exserted; filaments hairy at the base. Ovary and style glabrous; stigma of 2 equal divaricate lobes. Fruit 4 mm. long, pear-shaped; endocarp ridged, bony, 4-celled, 4-seeded.

Distribution: Near the sea from Bombay to Malacca, Ceylon, Andamans, Nicobars. —Malaya.

The root is bitter, pungent, heating; laxative, stomachic, alexipharmic; useful in anæmia, " vata ", diabetes chyluria, inflammations, swellings, bronchitis, dyspepsia, piles, constipation, fever.—The leaves are good as an external application to piles and tumours (Ayurveda).

The root is laxative, stomachic; good for liver complaints (Yunani).

A soup made of the leaves is occasionally used as a stomachic and carminative. The root forms an ingredient of *dasamula,* a preparation often prescribed by the native physicians in obstinate fevers.

A decoction of the leaves is given for flatulence.

The root is given in decoction as a cordial and tonic. The leaves rubbed along with pepper are administered in colds and fevers. The whole plant is used in the form of decoction in rheumatism and neuralgia.

In La Reunion, the root is considered stimulant and stomachic.

Bengal: Bhutbhiravi, Ganiari—; *Bombay:* Arni, Narvel—; *Burma:* Taungtangyi, Toungthangyee—; *Canarese:* Agnimandha, Ichu—; *Garhwal:* Bakarcha—; *French:* Arbre ă la migraine—; *Gujerati:* Arni—; *Hindi:* Agetha, Arni, Ustabunda—; *La Reunion:* Bois de bouc, Lingue blanc—; *Malayalam:* Munna—; *Marathi:* Aran, Chamari, Kharanarvel—; *Nepal:* Gineri—; *Oudh:* Ganniari—; *Sanskrit:* Agnibijaka, Agnimantha, Ananta, Arani, Araniketu, Ganakasika, Girikarnika, Havirmantha, Jaya, Jayanti, Jyotishka, Kanika, Karnika, Mathana, Nadeyi, Nadija, Pavaka, Pavakarini, Pittamata, Shriparna, Tanutvaka, Tarkari, Tejomantha, Vaijayantika, Vijaya, Vijayantika, Vanhimantha, Vanhimula—; *Seychelles:* Bois de sureau, Bois de syrop—; *Sinhalese:* Karnika, Middigass—; *Tamil:* Munnai,

Pasumunnai—; *Telugu:* Gabbunelli, Karnika, Nagura, Nelli, Pinnanelli, Tukkadu—; *Urdu:* Arani—; *Uriya:* Bhutobairi, Ogobothu—.

2. **Premna tomentosa** Willd. Sp. Pl. III, 314; Wight Ic. t. 1468.

A tree, bark fibrous, yellowish, shredding off in longitudinal flakes, branchlets covered with a dense yellow wool of stellate hairs. Leaves 10-15 cm., ovate, rounded or subcordate at base, acuminate, acute, entire, densely woolly with stellate hairs when young, becoming glabrous (or nearly so) above when mature; petiole 2.5-5 cm., woolly-pubescent. Flowers on very short pubescent pedicels, numerous, cymes rather close, stellate-pubescent, terminal; bracts linear. Calyx stellate-hairy, segments 5, equal. Corolla-lobes rounded, one considerably longer. Stamens slightly exserted. Drupe 6 mm., broadly ovoid, sparsely stellate-hairy; stone 4-celled, 4-seeded.

Distribution: Central Provinces, N. Circars, Deccan and Carnatic down to S. Travancore in deciduous forests up to about 4,000 ft., Ceylon.

An aromatic oil is obtained from the root, and used as a remedy in disorders of the stomach.

Burma: Kyunnalin—; *Canarese:* Ichu, Ije, Iti, Madike, Narele, Pite, Tavadike—; *Ceylon:* Kolukkutti—; *Kolami:* Katokoi—; *Koya:* Namuru—; *Malayalam:* Kattutekka, Kollikattutekka, Natekka—; *Marathi:* Chambara—; *Sinhalese:* Busairu, Gulseru—; *Tamil:* Kollikkattaittekku, Pinari, Podaganari, Podanganari—; *Telugu:* Kampugummudu, Naguru, Narava, Naruva, Narva, Narvu—; *Uriya:* Kotusumonthi, Sumonthi—.

3. **Premna latifolia** Roxb. Hort. Beng. (1814) 46; Wight Ic. t. 869.—Plate 737B.

A low bushy tree with trunk up to 1.2 m. girth, or shrubby with usually ovate, sometimes elliptic, leaves 5-17 cm. long, entire, pubescent beneath or both sides when young, and often permanently pubescent on the nerves beneath. Panicles 3-chotomous 5-12.5 cm. diam., hairy pubescent, with short oblong or lanceolate bracts, or upper bracts very small linear. Calyx pubescent or strigose, 5-toothed, not or scarcely 2-lipped. Corolla distinctly 2-lipped, 4-5 mm.

(including the lobes) long, upper lip oblong rounded entire or emarginate, lower longer with three spreading obtuse or rounded lobes. Drupe 6 mm. depressed globose, seated on the saucer-shaped or patelliform, subentire calyx.

Distribution: Bengal, N. Circars and Carnatic to Tinnevelly, near the coast in dry forest areas.

The leaves are diuretic, and are given internally and applied externally in dropsy. An infusion of 10 drachms of the leaves and 2 drachms of coriander in ten ounces of boiling water has been used with advantage in acute dropsy.

The milk of the bark is applied to boils, and the juice is given to cattle in colic.

Bengal: Gohara—; *Burma:* Kyetyo—; *Ceylon:* Pachumullai—; *Dehra Dun:* Bakar—; *Garhwal:* Bakarcha—; *Hindi:* Agniun, Bakar, Bakarcha, Basot, Basota, Jhatela, Tumari—; *Kumaon:* Agniu—; *Nepal:* Gineri—; *Punjab:* Bankar, Ganhila, Ganhin, Gian—; *Sinhalese:* Mahamidi—; *Tamil:* Erumaimunnai, Munnai, Pasumunnai—; *Telugu:* Nelli, Peddanellakure, Peddanellikura—; *Uriya:* Gondhona—.

4. **Premna esculenta** Roxb. Hort. Beng. (1814) 46.—Plate 737A.

A shrub with a short stem, all parts glabrous. Leaves elliptical to elliptically oblong and often narrowed at the rounded or unequal base, 5-10 cm. long, acuminate, on a very short glabrous petiole 4-6 mm. long, coarsely serrate-toothed, membranous, glabrous. Flowers small, yellowish white, on very short glabrous pedicels, forming a short-peduncled or almost sessile, glabrous, brachiate corymb at the end of the branchlets; bracts short, subulate, glabrous. Calyx glabrous, hardly 2 mm. long, unequally 5-toothed. Corolla yellowish white with a golden blotch at the base of the midlobe, the throat pilose. Drupes obovoid, globular, smooth, purplish, the putamen tubercled.

Distribution: Assam, Chittagong, also cultivated.

The leaves are diuretic and applied externally in dropsy.

5. **Premna herbacea** Roxb. Hort. Beng. (1814) 46.—PLATE 738A.

A small undershrub; stem hardly any; flowering branches 2.5-10 cm. springing up after the jungle fires. Leaves 10 by 5-7.5 cm., sessile, obovate, obtuse, mature, pubescent on the nerves, microscopically dotted above, minutely deciduously pubescent beneath, nerves 5 pairs. Corymbs 3.8 cm. diam., pubescent, somewhat dense; peduncle 0-3.8 cm. Calyx 2.5 mm., subequally 5-toothed, closely pubescent; lobes ovate, obtuse. Corolla 4 mm., greenish white, hairy in the throat, 4-lobed obscurely 2-lipped. Drupe 6 mm. diam., globose.

Distribution: Subtropical Himalaya, 500—3,000 ft., from Kumaon to Bhutan, N. Circars, W. Ghats of Madras Presidency.

A preparation of the root is given internally for rheumatism by the Santals (Campbell).

The plant, in combination with other drugs, is prescribed for the treatment of snake-bite (Sushruta, Rasaratnakara) and scorpion-sting (Sushruta); but it is not an antidote to either snake-venom (Mhaskar and Caius) or scorpion-venom (Caius and Mhaskar).

Bengal: Bamanhati, Bhuijam—; *Hindi:* Bharangi—; *Marathi:* Gantubharangi—; *Mundari:* Horacalu, Huringcarpandu, Otecalu, Otejo—; *Sanskrit:* Bhumjambu—; *Santali:* Kadamet—; *Tamil:* Bumisamba, Sirudekku—; *Telugu:* Adavinellikura, Ghantubharangi, Janna, Kuranelli, Nelaneredu—.

GMELINA Linn.

Trees or shrubs unarmed or spinous; young shoots usually tomentose. Leaves opposite, entire or toothed, sometimes more or less lobed. Flowers large, yellow or brownish yellow, often tomentose, in small dense or lax sessile or pedunculate cymes along the branches of a terminal panicle; bracts usually narrow, rarely leafy. Calyx campanulate, 4-5-toothed or subentire, persistent and unaltered in fruit. Corolla 2-lipped, infundibuliform, ventricose in the upper part; tube slender below, much swollen above; limb oblique, spreading, 4-5-lobed. Stamens 4, didynamous, inserted below the throat,

shorter than the corolla; anthers with oblong more or less discrete cells. Ovary 4-celled; ovule solitary in each cell; style slender; stigma shortly 2-fid. Fruit a succulent drupe; endocarp undivided, bony, 2-4-celled. Seeds oblong; albumen 0; cotyledons thick.—Species 8.—Indo-Malaya, Australia.

1. A tree .... 1. *G. arborea.*
2. A shrub .... 2. *G. asiatica.*

The genus is not therapeutically defined.

G. asiatica Linn. is used medicinally in Cambodia.

1. **Gmelina arborea** Roxb. Hort. Beng. (1814) 46; Corom. Pl. t. 246; Wight Ic. t. 1470.—PLATE 739.

A moderate sized unarmed deciduous tree, reaching 18 m. high; bark greyish yellow, rather corky; branchlets and young parts clothed with fine white mealy pubescence. Leaves 10-20 by 7.5-15 cm., broadly ovate, acuminate, entire, glabrous above when mature, stellately fulvous-tomentose beneath, base cordate or sometimes truncate and shortly cuneate; petioles 5-7.5 cm. long, cylindric, puberulous, glandular at the top. Flowers appearing with or sometimes before the young leaves, usually in small cymes of about 3 flowers arranged along the branches of a densely fulvous-hairy panicle reaching 30 cm. long; buds clavate, angular; bracts 8 mm. long, linear-lanceolate. Calyx 5 mm. long, broadly campanulate, densely fulvous-hairy; teeth 5, small, triangular, acute. Corolla brownish yellow, densely hairy outside, reaching 3.8 cm. long, 5-lobed, 2-lipped; upper lip rather more than 1 cm. long, deeply divided into 2 oblong, obtuse lobes; lower lip nearly 2.5 cm. long, 3-lobed, the middle lobe projecting forward, ovate, subobtuse, with irregularly crenulate margin, much longer and broader than the obovate rounded lateral lobes. Drupe 2-2.5 cm. long, ovoid or pyriform, smooth, orange-yellow when ripe.

Distribution: Throughout India, Ceylon.—Malayan and Philippine Islands.

The root is acrid, bitter, sweet, heating; indigestible; stomachic, laxative, anthelmintic; improves the appetite; useful in hallucinations, thirst, piles, abdominal pains, burning sensations, fevers, "tridosha", urinary discharges.—The flowers are sweet, cooling,

bitter, acrid; astringent; useful in leprosy and blood diseases.—The fruit is acrid, sour, bitter, sweet; cooling, diuretic, tonic, aphrodisiac, alterative, astringent to the bowels; promotes the growth of hair; useful in "vata", thirst, anæmia, leprosy, ulcers, consumption, strangury, vaginal discharges (Ayurveda).

The juice of the leaves is used to remove fœtid discharges and worms from ulcers.

In Bombay, the juice of the young leaves is used as a demulcent in gonorrhœa, cough, etc., either alone or combined with other drugs of similar properties.

The plant is recommended in combination with other drugs for the treatment of snake-bite (Charaka, Sushruta, Vagbhata, Vaidyavinoda) and scorpion-sting (Sushruta, Vagbhata, Yogaratnakara, Brihannighantharatnakara, Nighantaratnakara).

In snake-bite a decoction of the roots and bark (1 in 16) is given internally (Roberts).

All parts of the plant are equally useless in the antidotal treatment of snake-bite (Mhaskar and Caius) or scorpion-sting (Caius and Mhaskar).

Assam: Gomari—; *Bengal:* Gamari, Gumar, Gumbar—; *Bhil:* Chimman, Sag—; *Bombay:* Kasmari, Shewun—; *Burma:* Kyunboc, Kywonpho, Yamanai, Yemene—; *Cachar:* Gumai—; *Canarese:* Bachanige, Gupsi, Kashmiri, Kule, Kumbudi, Kumule, Shivani, Triparni—; *Central Provinces:* Gumbhar, Shiwun—; *English:* Candahar Tree, Cashmere Tree, Coomb Teak, White Teak—; *Garo:* Bolkobak—; *Gond:* Kurse—; *Gujerati:* Savan, Shivan, Sivan—; *Hasada:* Kasombardaru—; *Hazara:* Sewan—; *Hindi:* Gamari, Gambari, Gambhar, Gamhar, Gumbhar, Kambar, Kambhar, Khambhari, Khammara, Kumar, Kumbhar, Sewan, Shewan, Shiwan—; *Kadir:* Kumala—; *Kolami:* Gumher, Kasamar—; *Konkani:* Niuvon, Sivony—; *Koya:* Gumudu—; *Kumaon:* Khamara, Kumhar—; *Kurku:* Kassamar—; *Lambadi:* Gupsiro—; *Lepcha:* Numbon—; *Magahi:* Ramani—; *Malayalam:* Kumbili, Kumil—; *Marathi:* Gamar, Kamar, Shewan, Shiwan—; *Naguri:* Kasmardaru—; *Nepal:* Gambari, Khamari—; *Punjab:* Gumhar, Kumhar—; *Rajputana:* Sewan—; *Sanskrit:* Ashveta, Bhadra, Bhadraparni, Gambhari, Gandhari, Gandharya,

Gopabhadrika, Grishti, Hira, Kakodumbari, Kambharika, Kashmari, Kashmaryya, Kataphala, Krishna, Krishnaphala, Krishnavrintika, Kshirini, Kumuda, Madhubhadra, Madhumati, Madhuparnika, Madhurasa, Mahabhadra, Mahakumuda, Modini, Pitaphala, Pitarohini, Rohini, Sadabhadra, Sarvatobhadra, Sarvatobhadrika, Shriparni, Snigdhaparni, Sthulatvacha, Subhadra, Sudridhatvacha, Suphala, Svarubhadra, Vataha, Vidari, Vidarini—; *Santali:* Kasmar—; *Sinhalese:* Atdemmata—; *Tamil:* Arisa, Kalarbadi, Kattanam, Kumil, Kumbal, Perungumil, Pulirgumil, Umitekku—; *Telugu:* Adavigummudu, Challagummudu, Gummadi, Gummudu, Gumudu, Gumuduteku, Gumteku, Kasmari, Kasmaryamu, Peddagumudu, Peddagumudutekku, Teggummudu—; *Uriya:* Bhodropornni, Gombhari, Kashmori—.

2. **Gmelina asiatica** Linn. Sp. Pl. (1753) 626; Wight Ill. t. 174.—PLATE 738B.

A much-branched more or less spinous shrub; bark yellowish white; branchlets horizontal, rigid, puberulous, often much shortened and spinous at the ends. Leaves 2-3.8 by 1.3-2.5 cm., ovate or elliptic, sometimes irregularly and more or less obscurely lobulate, obtuse, glabrous, glaucescent beneath from a coating of minute round glands, base acute or rounded; petioles 6 mm. long. Flowers large, nodding, in terminal densely pubescent racemes or panicles; pedicels short, pubescent; bracts small, caducous. Calyx 4-5 mm. long, cup-shaped, truncate, pubescent, clothed with flattened round glands; lobes 4, very small, triangular, acute. Corolla 2-lipped, bright yellow, 4.5 cm. long or more, finely pubescent outside; tube narrow below, curved, very much inflated above; lobes 4, ovate, subacute, the lower one the largest. Drupe 2 cm. long, obovoid, yellow when ripe containing 1 pyrene.

Distribution: N. Circars, E. Deccan, Carnatic, Ceylon, planted in the Bombay Presidency and Bengal, Burma.

The root is aphrodisiac and expectorant; useful in the treatment of pain in the joints (Yunani).

The root is demulcent and alterative, astringent and aromatic. It is used for rheumatism, pains in the loins, and syphilitic diseases. At present it is principally employed as a demulcent for gonorrhœa and catarrh of the bladder.

The leaves and young shoots of this shrub abound with a thick, viscid mucilage, which is imparted readily to cold water, which when thus impregnated, is employed in the treatment of gonorrhœa to allay ardor urinæ.

In Cambodia, the whole plant in infusion is prescribed in yaws.

Behar: Bhedaira—; *Cambodia:* Anhchanh—; *Canarese:* Guludu, Kalshivani—; *Ceylon:* Kumil—; *French:* Coumelon, Gmelina d'Asie—; *Hindi:* Badhara—; *Madras:* Adivigumadi, Kumilamaram—; *Malayalam:* Kumil—; *Marathi:* Lahanshivan—; *Portuguese India:* Rais madre de Deus—; *Punjab:* Badhara—; *Sanskrit:* Gopabhadra, Vikarini—; *Shiharikota:* Adivigumadi—; *Sinhalese:* Demata, Gattademmatta—; *Tagalog:* Bagababoi, Babalayan—; *Tamil:* Arusavira, Kadambal, Kadukkumil, Kumirgodi, Nilakkumil—; *Telugu:* Chirugummudu, Chirunelli, Gumudu, Karugummadi, Karugummudu, Kavvagummudu, Nelagummudu, Peddanelli—; *Urdu:* Badhara—; *Uriya:* Gombhari, Gopogombhari, Nondano—; *Visayan:* Bagababoi, Balabalayan—.

VITEX Linn.

Trees or shrubs; young shoots hairy or tomentose. Leaves opposite, digitately 3-5-foliolate (sometimes simple in *V. trifolia*). Flowers in sessile or pedunculate cymes forming large or small terminal and axillary or wholly axillary panicles or corymbs; bracts small, longer or shorter than the calyx. Calyx campanulate, truncate or shortly 5- (rarely 3-) toothed. Corolla small, 2-lipped; tube short; limb 5-lobed, the middle lobe of the lower lip much the largest. Stamens 4, didynamous, usually exserted; anther-cells at first parallel and pendulous, afterwards divaricate, often twisting so that the lower ends are erect. Ovary 2-4-celled; ovules 4; style filiform; stigma shortly 2-fid. Fruit a globose or ovoid drupe, invested at the base by the somewhat enlarged calyx; endocarp bony, normally 4-celled and 4-seeded, but some of the cells often suppressed. Seeds obovate or oblong; albumen 0.—Species 120.—Tropical and temperate regions.

A. Inflorescence usually a terminal thyrsus	
1. Leaflets 3 or 5, lanceolate, entire, toothed or pinnatifid ..	2. *V. negundo.*
2. Leaves some simple some trifoliolate; leaflets elliptic or oblong-obovate, usually obtuse, the terminal leaflet sessile (rarely very shortly petiolulate)	1. *V. trifolia.*
3. Leaves long-petiolate, digitately 5-, rarely 7- foliolate; leaflets slightly tomentose above and green, below canescent, lanceolate-acuminate, attenuate at the base	5. *V. agnus-castus.*
4. Leaflets usually 3, the lateral sessile or nearly so, elliptic, 10-20 cm. long	6. *V. pubescens.*
B. Inflorescence always axillary	
1. Leaves 3-, or 5- foliolate; leaflets lanceolate, almost coriaceous, only midrib hairy on underside	7. *V. leucoxylon.*
2. Leaflets 3, membranous, lanceolate	3. *V. peduncularis.*
3. Leaves almost glabrous; leaflets 5	4. *V. glabrata.*

The bark is antisyphilitic. The fruits are given for stomach-ache and colic, for headache, catarrh, and watery eyes.

The following species are used medicinally in the South of Europe and the Levant—*V. agnus-castus* Linn.—; in China and the Philippine Islands—*V. negundo* Linn., *V. trifolia* Linn.—; in Annam —*V. trifolia* Linn.—; in the Gold Coast and Nigeria—*V. cienkowskii* Kotchy and Peyr.—; in Guinea—*V. cuneata* Schum. and Tonn.—; in South Africa—*V. reflexa* H. H. W. Pearson, *V. rehmanni* Guerke—; in Brazil—*V. montevidensis* Cham.—.

In Kelantan, a resin from *V. pubescens* Vahl, is used as an adjuvant for datura fumes.

1. **Vitex trifolia** Linn. Sp. Pl. (1753) 638.—PLATE 740B.

A shrub or small tree; bark smooth, pale grey. Leaves variable, some simple and some 3-foliolate; leaflets elliptic or oblong-obovate, usually obtuse, the terminal leaflet sessile (rarely very shortly petiolulate), 5-6.3 by 2.5-3.8 cm. the lateral smaller, sessile, all glabrous above, very densely white-tomentose beneath, base tapering; common petioles 1.3-1.6 cm. long. Flowers in pedunculate tomentose cymes, opposite along the tomentose rhachis of a terminal panicle; bracts minute. Calyx 3 mm. long in flower, white-pubescent, slightly enlarged in fruit; teeth very short, triangular, acute, sometimes obscure. Corolla pubescent outside, pale purple, rather more than 1 cm. long, 2-lipped; upper lip with 2 short obtuse lobes; lower lip 3-lobed, the middle lobe much the largest. Filaments hairy at the

base. Drupe globose, exceeding 6 mm. diam., purplish black when ripe, embraced for rather more than half its length by the veined persistent calyx; stone often 1- or 2- celled by abortion.

Distribution: Scattered throughout India in the tropical and subtropical region, Ceylon.—Japan, Philippines, N. Australia.

The leaves are acrid, pungent; anthelmintic; improve memory; favour the growth of hair; good for the eyes; useful in pains, inflammation, leucoderma, bad taste in the mouth, bronchitis, fever; applied externally in enlarged spleen, contusions, sprains, pain in the joints, swollen testicles.—The fruit is emmenagogue.—The root is tonic, expectorant, febrifuge (Ayurveda).

The powdered leaves have been given with success in cases of intermittent fevers, and the flowers are prescribed with honey in fevers accompanied with vomiting and severe thirst. Pillows stuffed with the leaves of this plant are used to cure catarrh and headache. The leaves are considered useful as an external application to all rheumatic pain, sprains, etc. The fruit is employed in amenorrhœa, etc.

Annam: Man kinh tu—; *Arabic:* Asla, Queabi—; *Bengal:* Panisamalu—; *Bombay:* Nirgundi—; *Burma:* Kiyoubhanbin, Yekiyubanbin—; *Canarese:* Karinochi, Lakki, Lakkili, Nekki, Nirulakki, Nochi—; *Chinese:* Man Ching, Man Kin—; *Deccan:* Panikishambali, Uljishanbali—; *Hindi:* Panikisanbhalu, Sufedsanbhalu—; *Ilocano:* Dangla—; *Malayalam:* Karinochi, Nirnochi, Nochi—; *Marathi:* Indrani, Lingur—; *Persian:* Banjangashteabi, Panjangushtaabi—; *Philippines:* Lagundindagat—; *Sanskrit:* Indranika, Indrasurasa, Jalanirgundi, Kashanashini, Krishnanirgundi, Nilanirgundi, Nilika, Sephalika, Shakrani, Shuklaprishthaka, Sindhuka, Sinduvara, Surasa, Svetapushpa, Svetasurasa, Visugandhaka—; *Sinhalese:* Nochchi, Vaturunikka—; *Tamil:* Karunochi, Nirnochi, Nochi, Sirunochi—; *Telugu:* Chiruvavili, Nilavavili, Niruvavili, Nochili, Tellavavili, Vavili—; *Tulu:* Karinekki—; *Uriya:* Begundia—.

2. **Vitex negundo** Linn. Sp. Pl. (1753) 638; Wight Ic. t. 519. —PLATE 740A.

A large shrub or sometimes a small slender tree; bark thin, grey; branchlets quadrangular, whitish with a fine tomentum. Leaves 3-5-

foliolate; leaflets lanceolate, acute, the terminal leaflet 5-10 by 1.6-3.2 cm. with a petiolule 1-1.3 cm. long, the lateral leaflets smaller with a very short petiolule, all nearly glabrous above, covered with a fine white tomentum beneath, base acute; common petioles 2.5-3.8 cm. long. Flowers in pedunculate branched tomentose cymes, opposite along the quadrangular tomentose rhachis of a large terminal often compound pyramidal panicle (axillary peduncles in the upper axils sometimes present); bracts 1.5-2.5 mm. long, lanceolate, caducous. Calyx 3 mm. long, white-tomentose; teeth triangular, 0.8-1 mm. long. Corolla 1 cm. long, bluish purple, tomentose outside, hairy inside at the insertion of the stamens; upper lip 2 mm. long, divided to the base into 2 obtuse lobes; lower lip large, 5 mm. long, with 2 short oblong obtuse lateral lobes 1.5 mm. deep, and a large broadly obovate crenulate terminal lobe 4 mm. long. Filaments hairy at the very base. Ovary glabrous; style glabrous; stigma forked. Drupe less than 6 mm. diam., black when ripe.

Distribution: Throughout India, Ceylon.—Afghanistan, tropical Africa, Madagascar, China, Philippines.

The plant has a pungent, bitter, acrid taste; heating, astringent, cephalic, stomachic, anthelmintic; promotes the growth of hair; useful in diseases of the eye, consumption, inflammations, leucoderma, enlargement of the spleen, bronchitis, asthma, biliousness, painful teething of children.—The root is an antidote to snake-venom (Ayurveda).

The root is considered tonic, febrifuge, and expectorant.

The leaves are aromatic, tonic and vermifuge. A decoction of Nirgundi leaves is given with the addition of long pepper in catarrhal fever with heaviness of head and dullness of hearing. A pillow stuffed with the leaves of Nirgundi is placed under the head for relief of headache. The juice of the leaves is said to have the property of removing fœtid discharges and worms from ulcers. An oil prepared with the juice of the leaves is applied to sinuses and scrofulous sores.

The leaves are discutient, and are useful in dispersing swellings of joints from acute rheumatism and of the testes from suppressed gonorrhœa. In the Konkan, the juice of the leaves with that of Maka

(*Eclipta alba*) and Tulasi (*Ocimum sanctum*) is extracted, and Ajwan seeds are bruised and steeped in it, and given in doses of six massas for rheumatism. The juice in half tola doses with ghi and black pepper is also given, and in splenic enlargement 2 tolas of the juice with 2 tolas of cow's urine is given every morning.

Hove, (1787), states that the Europeans in Bombay call it the fomentation shrub, and that it is used in the hospitals there as a foment in contractions of the limbs occasioned by the land winds.

The decoction of the leaves is used as a bath in the puerperal state of women in India. The people of Mysore are in the habit of treating febrile, catarrhal and rheumatic affections by means of a vapour bath prepared with this plant.

The dried leaves are smoked for the relief of headache and catarrh. The dried fruit acts as a vermifuge.

In China and Malaya, the fruits are given for headache, catarrh, and watery eyes.

In Ceylon, the leaves, bark, and roots are used for toothache, rheumatism, eye disease; and as a tonic, carminative, and vermifuge.

Among the Mundas of Chota Nagpur, an expectorant is prepared from the sap. Some six green branches are warmed over a fire and the sap which flows from their cut extremity is collected in a vessel. This sap is warmed and mixed with clarified butter in which three pounded bulbs of garlic have been fried. The patient drinks a little of this now and then.

The plant is recommended for the treatment of snake-bite (Charaka, Sushruta, Vagbhata, Vrindamadhava, Rasaratnakara, Bapat) and scorpion-sting (Charaka, Sushruta).

In case of snake-bite, the bruised roots, bark, and leaves are applied to the wounds. The expressed juice of the fresh leaves is poured into the nostrils in stupor and coma, and is given internally. A decoction of the roots and bark is also given internally (Roberts).

In tarantula bites, the bruised bark and leaves are applied to the wounds. The expressed juice of the fresh leaves is given internally (Roberts).

No part of the plant is an antidote to snake-venom. The leaves are useless as an errhine, and the bark, roots, and leaves are also useless as an external application in the treatment of snake-bite (Mhaskar and Caius).

The plant is not an antidote to scorpion-venom (Caius and Mhaskar).

Arabic: Aslag, Fanjangasht, Zukhamsateasabea, Zukhamsatilourag—; *Bengal:* Nirgundi, Nishinda, Nisinda, Samalu—; *Berar:* Semalu—; *Bombay:* Katri, Lingur, Nargunda, Nirgundi, Nirgur, Nisinda, Shiwari—; *Burma:* Kiyowbhanbin, Kiyubanbin—; *Canarese:* Bilenekki, Karilakki, Lakki, Lakkili, Lekkigidda, Nekki, Niragundi, Nochi, Nukki, Shurnboli—; *Cantonese:* King tz, Wu chi ching—; *Chinese:* Houang Kin, Mu Ching—; *Deccan:* Shamalu, Shambali—; *Dehra Dun:* Chhatimal, Nishinda, Shimalu, Sumalu—; *English:* Indian Privet—; *Gond:* Nirgiri—; *Gujerati:* Nagaol, Nagda, Nagoda, Nagodz, Nigod, Nirgari—; *Hasada:* Huridaru—; *Hindi:* Mewri, Nengar, Ningori, Nirgandi, Nirgunda, Nisinda, Panikisambhalu, Sambhal, Sambhalu, Sanbhalu, Shawali, Shiwali, Shiwari, Sindhuca, Sinduari—; *Jaunsar:* Soni—; *Kharwar:* Sindwar—; *Kolami:* Ehuri, Hobaro, Sinduari, Sindwor—; *Koya:* Vayila—; *Kumaon:* Shiwa, Shiwali, Simali—; *Kurku:* Nirgudi—; *Malaya:* Ching tzu, Huang ching, Kheng chee, Man ching—; *Malayalam:* Indrani, Nochi, Vellanochi, Vennochi—; *Marathi:* Lingur, Nirguda, Nirgunda, Nirgundi, Nirgur—; *Mundari:* Bigana, Huri, Huhuri, Sursing—; *Naguri:* Huhuridaru—; *Nepal:* Sewali—; *Persian:* Banjangasht, Panjangusht, Sisban—; *Philippines:* Agnocasto—; *Punjab:* Bankahu, Banna, Binna, Biuna, Marwa, Marwan, Mawa, Maura, Mora, Morann, Moraun, Sanake, Shwari, Swanjan, Torbanna, Wana—; *Pushtu:* Marwandai, Mehrwan, Warmande—; *Sadani:* Senduar—; *Saharanpur:* Malla—; *Sanskrit:* Indrani, Nilapushpa, Nilanirgundi, Nirgundi, Shephali, Sinduvara, Surasa, Suvaha, Svetasurasa—; *Santali:* Sinduari—; *Sinhalese:* Nikka, Nilnikka, Sudunikka—; *Tagalog:* Lagundi, Malawin, Molavin—; *Tamil:* Nirkkundi, Nochi, Sinduvaram, Tiriburamerittan, Vellainochi, Vennochi—; *Telugu:* Nallavavili, Sinduvaramu, Vavili, Vayila—; *Tulu:* Bilenekki, Nekki—; *Uriya:* Begundia, Indrani—.

3. **Vitex peduncularis** Wall. Cat. 1753.—Plate 741.

A tree, 6-12 m.; shoots cinereous-pubescent. Leaves 3-foliolate; leaflets 11.5 by 2.5 cm., acuminate, petioluled, lanceolate, entire, mature, glabrate, densely covered by minute yellow glands beneath, midrib sometimes peberulous; petiolule of the middle leaflet 4-8 mm.; petiole 5-10 cm., slender or sometimes slightly winged. Panicles long-peduncled elongate many-flowered cinereous-farinose. Peduncles 7.5-10 cm., from the penultimate axils; panicles often 15-20 by 5 cm., open; bracts 2 mm., linear. Calyx 2.5 mm., grey-pubescent, subtruncate. Corolla 5 mm., grey-pubescent. Drupe 5 mm. diam., cuboid-globose.

Distribution: Bihar, Assam, Bengal, Tenasserim.

In Chota Nagpur, the bark is used for making an external application for pains in the chest (Campbell).

The plant is used in various ways, chiefly as an infusion of the leaves or of the root bark or young stem bark, in fever of malarial type, and especially in blackwater fever. Several cases of malarial fever and blackwater fever were successfully treated with the infusion of the leaves (J. C. S. Vaughan; *British Med. Journ.* February, 1921).

1. Chemical analysis of the dried leaves of *Vitex peduncularis* shows the presence of traces of an alkaloid.— 2. In our series of cases of malarial fever, however, caused by *Plasmodium vivax, P. malariae* and *Laverania malariae*, the freshly prepared infusion of dried leaves had no effect whatever on the parasites in the blood, on the temperature chart or on the other clinical symptoms.— 3. The drug appears to be absolutely useless in the treatment of malaria (Chopra and Knowles; *Ind. Med. Gazette*, March, 1924).

Assam: Osai—; *Bengal:* Boruna, Goda—; *Burma:* Kyetyo, Pazinnyo—; *Cachar:* Hilaauwal—; *Canarese:* Navaladi—; *Garo:* Shelangri—; *Hindi:* Charaigorwa, Chhagriaruba, Minjurgorwa, Nagbail, Nagpheni—; *Magahi:* Krawru—; *Santali:* Bhadu, Marak—; *Uraon:* Eratatka—.

4. **Vitex glabrata** R. Br. Prodr. 512.—Plate 742.

Large tree. Leaves chartaceous, digitate, 3-5-foliate; leaflets subequal except small lowest pair, obovate-elliptic to oblanceolate,

blunt or acuminate, pubescent when young, glabrous except the nerves beneath when adult; nerves 10-20 pairs, subparallel; petiolules terminal one 2-2.5 cm., the others 6-13 mm. long; petioles 7.5-15 cm. long. Cymes axillary, corymbose, 7.5-10 cm. long, lax, dichotomous. Calyx campanulate, 1.25-25 mm. long, pubescent outside; teeth very short, acute. Corolla-tube broad, cylindric, pubescent outside, a ring of hairs inside at insertion of stamens, midlobe villous, blue, rest white. Stamens long, exsert, villous. Drupe succulent, ovoid or obovoid.

Distribution: S. Assam and Cachar to Malacca.—Siam, Cochin-China, Malaya, Australia.

The bark and root are used as astringents.

Assam: Bhodiya—; *Bengal:* Ashwal, Goda, Horina—; *Bombay:* Longarbisthiras, Sheraz—; *Burma:* Htoukshar, Tauksha—; *Canarese:* Karril, Sengeni, Senkane—; *Magahi:* Tokra—; *Marathi:* Longarbithiras, Sherasa, Songarbi—; *Telugu:* Luki, Nevaledi—.

5. **Vitex agnus-castus** Linn. Sp. Pl. (1753) 890.

A shrub or tree; branches obtusely quadrangular, tomentose, passing into a wide panicle. Leaves long-petiolate, digitately 5-rarely 7- foliolate, leaflets slightly tomentose above and green, below canescent, lanceolate, acuminate, attenuate at the base, petiolulate, subentire. Cymes compact, subsessile, forming long-spiked verticilasters. Bracts minute or absent. Calyx tomentose, campanulate, teeth triangular, obtuse, 3-times shorter than the tube. Corolla lilac, 3-times as long as the calyx, tube subexserted, throat inflated, mouth glabrous. Drupe spherical, obtuse, slightly longer than the calyx.

Distribution: Baluchistan.—Afghanistan, W. Asia, Mediterranean.

The seeds have a bitter pungent taste; heating, stomachic, abortifacient, diuretic, alexiteric; cause biliousness; useful in "kapha" and "vata", pruritus, itching, burning sensations, thirst; improve taste (Ayurveda).

The seeds are bitter; astringent; purify the brain and the liver; useful in inflammations, pains, dropsy, enlargement of the spleen (Yunani).

In the Loralai, Bori and Barkhan tahsils of Baluchistan, the plant is used for pains due to chills, one who has taken cold takes a bath in water in which the leaves have been boiled. In Kohlu, the plant is a cure for eye diseases as well as for stomach-ache. At Turbat in Makran, the seed is boiled in ghi and the mixture given to horses for colic (Hughes-Buller).

The plant is recommended for snake-bite (Charaka, Sushruta, Vagbhata, Rasaratnakara) and scorpion-sting (Charaka, Sushruta); but it is not an antidote to either snake-venom (Mhaskar and Caius) or scorpion-venom (Caius and Mhaskar).

Arabic: Athlak—; *Barkhan:* Marmandai—; *Bori:* Marmandai—; *Catalan:* Agnocast, Aloc, Aloch, Pebre foll de Espanya—; *Chaman:* Marwandi—; *Dutch:* Kuischboom—; *English:* Agnus-castus, Chaste Tree—; *French:* Agnos, Agnus castus, Petit poivre, Poivre des moines, Poivre sauvage, Faux poivrier—; *German:* Keuschbaum, Keuschlamm—; *Greek:* Elaiagnos—; *Italian:* Agnocasto, Vitice—; *Kohlu:* Gung—; *Loralai:* Marmandai—; *Makran:* Gwanik—; *Malta:* Common Chaste-tree, Agno-casto, Vitice, Adiba, Ghadiba—; *Persian:* Panjangusht—; *Shahrig:* Marwand—; *Spanish:* Agno-casto, Pimientillo, Pimiento loco, Sausgatillo—; *Turbat:* Gwanik—.

6. **Vitex pubescens** Vahl Symb. III, 85.

Bushy tree about 6-18 m. tall; stem thick, young parts pubescent. Leaves chartaceous, 3-5-foliate, middle leaf largest, obovate or elliptic, blunt or acuminate, base round or cuneate, nearly glabrous above, pubescent beneath, mid-leaflet 15-20 cm. long, 7.5 cm. wide; petiolules 6 mm. long to 0; petioles 5-10 cm. long. Panicles pyramidal pubescent, up to 25 cm. long, 15 cm. through. Bracts ovate or spathulate persistent. Calyx campanulate tomentose, 3.8 mm. long. Corolla 2-lipped, tube pubescent, lower lobe long, violet blue. Drupe globose, 5 mm. through, black.

Distribution: Deccan Peninsula, E. Bengal, Malay Peninsula.—Malay Islands.

In Malaya, the resin is burnt with datura seeds to produce lethargy.

Burma: Htouksha, Kyetyo, Kyetyob—; *Malay:* Leban, Leban hitam, Leban tandok—; *Tamil:* Mailadi, Myladi—; *Telugu:* Busi,

Nemaliadugu, Nevaladugu, Nevali adugu, Nowli eragu—; *Uriya:* Muria—.

7. **Vitex leucoxylon** Linn. f. Suppl. (1781) 293 (non Kurz). —*Wallrothia leucoxylon* Roth.; Wight Ic. t. 1467.

A large deciduous tree with spreading head; trunk thick, short; bark smooth, light-coloured; young parts more or less pubescent. Leaves 3-5-foliolate (when 5-foliolate the basal pair of leaflets much smaller than the other pair); leaflets petiolulate, oblong, subobtuse, the terminal leaflet usually the largest, reaching 7.5-10 by 2.5-3.2 cm., all glabrous above, pale and more or less hairy with yellowish hairs on each side of the midrib and with close reticulate venation beneath, base usually acute, often unequal-sided; petiolules 6 mm. long; common petioles 3.8-5 cm. long, not winged. Flowers fragrant, in axillary pedunculate lax corymbose cymes; peduncles 2.5-6.3 cm. long; bracts 2 mm. long, lanceolate, caducous. Calyx pubescent or tomentose, 3 mm. long; teeth 5, small, triangular. Corolla 1.3 cm. long, pubescent outside, white with purplish hairs; upper lip 4 mm. long, divided to the middle into 2 rounded lobes; lower lip 3-lobed, 1 cm. long, nearly as broad across the 2 obtuse lateral lobes, the middle lobe broadly obovate, projecting, hairy in the centre with purplish hairs and with crisped margin. Filaments hairy at the base. Ovary densely hairy at the top with erect white hairs. Drupe 2 cm. long, succulent obovoid, blunt, dark purple when ripe, supported on the enlarged flattened calyx; stone large 4-celled and 4-seeded.

Distribution: All forest districts of Madras Presidency; W. Peninsula, Ceylon.

The root and the bark are astringent; the fruit is anthelmintic.

The root is used in intermittent fever.

The leaves are smoked in catarrh and for headache.

Burma: Htouksha—; *Canarese:* Holenekki, Kareyile, Lakki, Sangane—; *Ceylon:* Kaoldunochi, Nirnochi—; *Malayalam:* Attunochchi, Karil, Mayilila—; *Sinhalese:* Nebedda—; *Tamil:* Kattunochi, Nirnochi—; *Telugu:* Jinnukoyi, Kondavavili, Lokki, Nevaledi—.

CLERODENDRON Linn.

Trees or shrubs sometimes sarmentose. Leaves opposite, rarely 3-4-nate, simple, entire or toothed. Flowers in axillary cymes or terminal panicles often leafy below; bracts conspicuous or small; bracteoles 0. Calyx campanulate, truncate or 5-toothed or almost 5-partite, persistent, often accrescent or coloured. Corolla-tube slender, usually long; limb more or less oblique, with 5 spreading lobes. Stamens 4, didynamous, much-exserted; anthers ovate or oblong, the cells parallel. Ovary imperfectly 4-celled; ovule solitary in each cell; style filiform; stigma shortly 2-fid. Fruit a globose succulent (very rarely dry) drupe, 4-grooved, separating into 4 pyrenes, of which 1-3 are sometimes suppressed. Seeds oblong; albumen 0.—Species 150.—Tropics and subtropics.

A. Corolla-tube less than 3.8 cm.
- I. Peduncles mainly axillary
  - a. Leaves obovate or elliptic, subobtuse, entire, glabrate .... 1. *C. inerme.*
  - b. Leaves ovate, sinuate or serrate, mature puberulous or pubescent beneath .... 2. *C. phlomidis.*
- II. Panicles terminal, elongate, conspicuously bracteate. Calyx subtruncate .... 3. *C. serratum.*
- III. Panicles terminal, capitate or corymbose .... 4. *C. infortunatum.*

B. Corolla-tube more than 7.5 cm., filiform .... 5. *C. siphonanthus.*

C. commersonii Spreng. is used medicinally in China; *C. infortunatum* Gærtn. in the Philippine Islands; *C. heterophyllum* R. Br. in the islands of Madagascar and La Reunion; *C. capitatum* Schm. and Thb., *C. glabrum* E. Mey., *C. myricoides* R. Br., *C. triphyllum* Pearson in Southern Africa.

1. **Clerodendron inerme** Gærtn. Fruct. I (1788) 271, t. 57.—PLATE 743.

A straggling much-branched shrub 0.9-2.1 m. long, sometimes scandent; bark pale brown; branches twiggy. Leaves opposite (rarely ternate), 2-5 by 1.3-2.5 cm., elliptic or obovate, obtuse, glabrous or nearly so, base acute; petioles 6-10 mm. long. Flowers in axillary pedunculate cymes 3-9- (commonly 3-) flowered; peduncles long, slender, 1.3-4.5 cm. long; bracts minute, linear or subulate. Calyx 5 mm. long, enlarged in fruit, glabrous or puberulous, somewhat

leathery; teeth about 1.2 mm. long, triangular, acute. Corolla white; tube long, slender, reaching 2.5 cm. long or even more, glabrous outside, very hairy inside; lobes subequal, 6-10 mm. long, oblong, obtuse, with slightly crenulate margins. Filaments very long, hairy at the base, much exserted. Ovary glabrous; style glabrous, much exserted; stigma acutely 2-lobed. Drupe pyriform, 1.3-1.6 cm. long, seated in the veined persistent enlarged calyx, separating into 4 woody pyrenes.

Distribution: Throughout India near the sea, Ceylon.

The juice of the leaves and root is considered alterative in scrofulous and venereal affections, the dose being a tablespoonful with or without a little castor oil.

The dried leaves are used for the same purpose, and a poultice of the leaves is used to resolve buboes; a bath prepared with them is used in mania, while the root boiled in oil affords a liniment useful in rheumatism.

In Bombay, the plant has a great reputation as a febrifuge; the juice of the leaves is used in doses of half an ounce. The medicinal properties of *C. inerme* closely resemble those of Chiretta. The dried leaves have been found to be quite as efficient as the juice of the fresh plant; they should be dried in the shade to preserve their aroma, and may be administered in decoction with aromatics, or powdered and made into pills. A tincture has also been found to be an efficient preparation.

The Malays and Macassars administer the berries or the root to people poisoned by eating unwholesome fish; the leaves smeared with oil are heated over the fire and applied to recent wounds; they are also one of the leaves used for preparing the green rice of the Malays.

Bengal: Banjai, Banjuen, Batraj, Bonjoi, Bunjoin, Bunjumat—; *Bombay:* Vanajai—; *Burma:* Pirolaikyout—; *Canarese:* Kundali, Nayitakkali, Vishamadhari—; *Ceylon:* Pinari, Pinchil—; *Deccan:* Isandhari, Sangkupi—; *Hindi:* Lanjai, Sangkupi—; *Malay:* Pawan—; *Malayalam:* Nirnochi—; *Marathi:* Vanajai; *Sanskrit:* Kundali, Samudrayuthika, Vanajai, Vanayuthika—; *Sinhalese:* Walguranda—; *Tamil:* Anjali, Nirnochi, Pinarichanganguppi,

Pinarichangu, Sanganguppi, Sarupparachi—; *Telugu:* Etipisangi, Etipisinika, Erupucha, Nillavuppi, Pisangi, Pisinika, Takkolakamu, Takkolamu, Uti—; *Uriya:* Cholora—; *Visayan:* Baliseng—.

2. **Clerodendron phlomidis** Linn. f. Suppl. (1781) 292.—*C. phlomoides* Willd.; Wight Ic. t. 1473.—PLATE 744.

A large bush or small tree, reaching 9 m. high, with more or less pubescent branches. Leaves 3.8-6.3 by 3.2-3.8 cm., ovate or subrhomboid, obtuse or acute, coarsely crenate-dentate or subentire, undulate, glabrous above, more or less puberulous beneath, base truncate or subcordate; petioles 6-20 mm. long. Flowers moderate sized, fragrant, in small dichotomous axillary cymes arranged so as to form a rounded terminal panicle; bracts obovate or lanceolate, acute, leafy. Calyx 1 cm. long or more, divided about half way down, glabrous, not enlarged in fruit; segments ovate, acutely acuminate, veined. Corolla white or pinkish; tube 2-2.5 cm. long, slightly pubescent outside, glabrous inside; lobes nearly equal, exceeding 6 mm. long, elliptic, obtuse, veined. Filaments slightly pubescent below. Ovary and style glabrous. Drupe 6 mm. long, broadly obovoid, depressed, the top about level with the points of the persistent calyx-lobes, normally 4-lobed with 1 pyrene in each lobe (1-3 sometimes suppressed).

Distribution: Throughout India in the drier parts, Baluchistan, Ceylon.

The properties are the same as those of *Premna integrifolia;* but more useful in inflammations (Ayurveda).

In Bombay, the root is used as a bitter tonic, and is given in the convalescence of measles.

In Southern India, the juice of the leaves is given in neglected syphilitic complaints in doses of half an ounce or more twice daily.

The Santals rub the plant over their bodies in dropsy and give it to their cattle to cure them of diarrhœa and worms or when the stomach swells (Campbell).

Bombay: Airan—; *Canarese:* Taggi—; *Gujerati:* Arni, Irun—; *Hindi:* Arni, Piran, Pirun, Urni—; *Las Bela:* Tankar—; *Malayalam:* Tirutali—; *Marathi:* Airanamula, Arani, Arni, Iran—; *Sanskrit:* Agnimantha, Agnimanthini, Arani, Gandhapatra, Gandhapushpa,

sensation, hiccough, consumption, epilepsy, tuberculous glands, wounds.—The leaves are useful in fevers, burning sensation, hiccough, "tridosha" (Ayurveda).

The root increases appetite; lessens expectoration; useful in inflammations, bronchitis, asthma, fever (Yunani).

The root is used in febrile and catarrhal affections. Ratnagiri people consider it very effective in malarial fevers.

Leaves boiled with oil and butter made into an ointment are useful in cephalalgia and ophthalmia. The seeds bruised and boiled in butter milk are used as aperient and in dropsy.

It is given in catarrhal affections of the lungs, rheumatism, and dyspepsia. A decoction of the root of this plant (1 in 20) was administered to cases of catarrhal bronchitis with little or no benefit (Koman).

The leaves are, one of the snake remedies (Sushruta, Bapat), and the root is used for scorpion-sting (Sushruta); but they are no antidote to either snake-venom (Mhaskar and Caius) or scorpion-venom (Caius and Mhaskar).

Bombay: Bharang, Bharangi—; *Burma:* Baikyo, Bebya, Begyo—; *Canarese:* Gantubarangi, Kiritekki—; *Gujerati:* Bharungi—; *Hindi:* Barangi—; *Jaunsar:* Banbakri—; *Lepcha:* Satapat, Yi—; *Malay:* Lampin budak, Mata kesing—; *Malayalam:* Cherutekku, Kankabharnni, Kantani, Napalu—; *Marathi:* Bharangi—; *Mundari:* Saramlutur—; *Nepal:* Andekhi, Chua—; *Sadani:* Bhaoarmali—; *Sanskrit:* Angaravallari, Angaravalli, Baleya, Barbara, Bharangi, Bhargavi, Bhargi, Bhramareshta, Bhrigubhava, Bhriguja, Bhringaja, Bramhanayashtika, Bramhani, Bramhi, Bramhika, Durva, Dvidandi, Gardabhashaka, Hanjika, Kalingavalli, Kasaghni, Kasajita, Kharashaka, Mukhadhanta, Padma, Phanji, Phanjika, Shakramata, Svarupa, Valeyashaka, Vantari, Varddhaka, Varvara, Vatari, Yashti—; *Santal:* Saramlutur—; *Saora:* Neta—; *Sinhalese:* Kenhenda—; *Tamil:* Angaravalli, Kandubarangi, Sirudekku, Vadamadakki—; *Telugu:* Barangi, Bharangi, Bhramaramari, Chiruteka, Gantubarangi, Panja, Suvvipi—; *Urdu:* Bharangi—; *Uriya:* Chinda, Penjura—.

4. **Clerodendron infortunatum** Linn. Sp. Pl. (1753) 637; Wight Ic. t. 1471.—PLATE 746.

A shrub 0.9-2.4 m. high, often gregarious; branchlets bluntly quadrangular, clothed with yellowish silky pubescence. Leaves large, 10-25 by 9-20 cm., ovate, acuminate, thinly hairy on both sides, more strongly so on the nerves beneath, entire or denticulate, reticulately veined, base cordate or rounded; petioles 3.8-10 cm. long, cylindric, hairy. Flowers on rather long pubescent pedicels, in stalked cymes forming large pubescent panicles; bracts leafy, deciduous. Calyx 1.3 cm. long in flower, much enlarged in fruit (sometimes reaching in fruit 3.8 cm. across the lobes when spread out), divided to within about 3 mm. of the base, silky-pubescent; segments broadly lanceolate, very acute. Corolla densely pubescent outside, white tinged with pink; tube 2 cm. long, slender; lobes exceeding 1 cm. long, oblong, obtuse. Filaments glabrous. Ovary and style glabrous. Drupe 8 mm. diam., black, nearly globose, seated on the enlarged pink calyx, containing 4-1 pyrenes.

Distribution: Throughout India, Ceylon.—Malaya.

The plant has a bitter, pungent taste with a flavour; tonic, aphrodisiac, antipyretic, anthelmintic; useful in biliousness, " kapha ", " tridosha ", leucoderma, thirst, burning sensations, foul odours, diseases of the blood (Ayurveda).

The leaves and roots are employed externally for tumours and certain skin diseases.

The leaves are a cheap and efficient substitute for *chiretta* as a *tonic* and *antiperiodic*. The fresh juice is employed as a vermifuge, and also as a bitter tonic and febrifuge in malarious fevers, especially in those of children. It is used as an injection into the rectum in cases of ascarids.

The leaves enter into the composition of pills used by the Mundas of Chota Nagpur in a chest complaint with cough and difficult expectoration.

The sprouts are recommended in the treatment of snake-bite (Charaka, Sushruta); the leaves and flowers are prescribed in scorpion-sting (Charaka, Sushruta); but they are not an antidote to

either snake-venom (Mhaskar and Caius) or scorpion-venom (Caius and Mhaskar).

Bengal: Bhant, Ghentu—; *Bombay:* Bhandira, Bhat, Kahi, Kari—; *Burma:* Bujiphyu, Kaaunggyl, Khaounggyi—; *Canarese:* Basavanapada, Ibbane, Ittevu, Parele—; *Dehra Dun:* Karu—; *Hindi:* Bhant, Bhat, Ghato, Thunera—; *Kolami:* Kulamarsal—; *Lepcha:* Kambaldum, Kdung—; *Malayalam:* Peruku, Peruvellam, Vattaperuvellam—; *Marathi:* Bhandira, Kari, Thunora—; *Mechi:* Lukunah—; *Mundari:* Camgar, Kulamarsal—; *Nepal:* Chitu—; *Punjab:* Kalibasuti—; *Ramnagar:* Bhanua—; *Reddi:* Papa—; *Sanskrit:* Barhibarha, Barhichuda, Bhandira, Bhantaka, Bhanti, Harita, Kiravarnaka, Kukkura, Mayurachuda, Shirnaroma, Shirnaromaka, Shukabarha, Shukachhada, Shukapuchhaka, Sthauneyaka, Vikacha, Vikirnaroma, Vikirnasanjna—; *Santal:* Barni, Kharbari, Varni—; *Saora:* Mangalagiddi—; *Sinhalese:* Gaspinna—; *Tagalog:* Campangilgubat—; *Tamil:* Karukanni, Perugilai, Vellaikkanni—; *Telugu:* Basavanapadu, Bogada, Chirmabusi, Guruja, Gurrapukattiyaku, Mandukabrahmi, Sarasvatiyaku—; *Tulu:* Ittai—; *Uriya:* Bhania, Bondari, Kodombo—.

5. **Clerodendron siphonanthus** R. Br. in Ait. Hort. Kew. ed. 2, IV (1812) 65; Wight Ill. t. 173.—PLATE 747.

A tall erect little-branched shrub 1.2-3.6 m. high; stems herbaceous, fluted, hollow. Leaves in whorls of 3-5, 15-23 by 2.5-3.8 cm., oblong, shortly acuminate, base narrowed, entire or sinuate, glabrous; lateral nerves about 8 pairs, strongly curved and anastomosing near the margin; petiole 0. Flowers 1.8 cm. across, 7.5-10 cm. long, white, in lax usually 3-flowered cymes in the axils of the upper leaves forming a long terminal panicle. bracts 2.5-13 mm. long, linear. Calyx 7.5-13 mm. long, cleft half way down, lobes oblong or ovate, acute. Corolla-tube 7.5-10 cm. long, curved, very slender; lobes 1.3 cm. long, ovate-oblong. Fruit 1.3 cm. across, dark bluish green when ripe, seated on the enlarged red calyx.

Distribution: Deccan and Carnatic, W. coast districts of Madras Presidency, Kumaon, from Sikkim and Assam to Tenasserim.—Sumatra, cultivated in both hemispheres.

The properties are the same as those of *C. serratum* (Ayurveda).

glabrous, smooth and shining above, pale and with a hard thin tomentum beneath, base acute, attenuated into the petiole; main nerves 4-6 pairs with reticulate venation between; petioles 6-8 mm. long. Flowers dingy yellow, sessile in small heads, on rigid angular peduncles which are often 2 together in the upper axils or several in small terminal thyrses; bract and 2 bracteoles concave, ciliate, shorter than the sepals. Calyx 5-partite almost to the base; sepals 3-4 mm. long, broadly ovate or suborbicular, obtuse, concave, ciliate. Corolla 1.3 cm. diam.; lobes 4, ovate, acute, subequal. Stamens exserted. Ovary and style together reaching 6 mm. long, the ovary tapering into and about as long as the style, both villous; stigma shortly 2-fid. Capsules 2.5-3.8 cm. long, ovoid, compressed, beaked, green, wrinkled especially at the base. Seed completely filling the fruit, often germinating on the tree.

Distribution: Throughout India in salt marshes and tidal creeks, Baluchistan, Ceylon. —Malaya, shores of the Indian and Pacific Ocean.

The roots possess aphrodisiac properties. The unripe seeds are used as poultice to hasten suppuration of boils and abscesses. It is used for small-pox in Madras. The bark is astringent.

Arabic: Schora, Sciora—; *Bengal:* Bani, Bina—; *Bombay:* Tivar—; *Bourail:* Heun—; *Burma:* Lameb, Thame, Thamenet, Thamipiyu—; *Canarese:* Ipati, Uppati—; *Ceylon:* Kanna—; *Cutch:* Baklananjhad, Cherian, Timar—; *English:* White Mangrove—; *French:* Paletuvier blanc—; *Gujerati:* Tavariyan—; *Hindi:* Bina—; *Makran:* Timar—; *Malay:* Api-api—; *Malayalam:* Uri, Urppam—; *Marathi:* Tivar, Tiwar—; *New Caledonia:* Heun—; *Porebunder:* Tavar—; *Saho:* Schaura—; *Sakalave:* Afiafy—; *Sanskrit:* Sagarodhurga, Tuvara, Tuvaraka—; *Sind:* Tivar—; *Sundriban:* Baen, Bani, Bini—; *Swahili:* Mchu—; *Tagalog:* Apiapi, Bungalon, Bungalu, Calapini, Miapi, Pipisic, Piapi—; *Tamil:* Kandal, Karungarudal, Madaipattai, Uppattam, Uppukkutti, Vengandal—; *Telugu:* Eriva, Erivogu, Gundumada, Mada, Madda, Nallamada, Tellamada—; *Visayan:* Bungalon, Miapi, Piapi—; *Zambales:* Calupines—.

2. **Avicennia tomentosa** Jacq. Enum. Pl. Carib. 25; Brown Prod. Fl. Nov. Holl. I, 518.

A tree of variable size; branches cylindrical, fusco-canescent, spreading. Leaves approximate, patent, opposite, oval, obtuse, entire, at the base subattenuate-acute, 7.5-10 cm. long, coriaceous, lucid above, below soft, covered with minute scales, midrib elevated, nerves very thin anastomosing inside the margin, veins capillary forming a network, only visible when dry; petiole 1.3 cm. long, above slightly sulcate, the groove towards the base widened, villous, marginate. Panicle terminal, erect, subbrachiate, simply branching, consisting of bracteolate fascicles of small sessile flowers; sometimes there arises one or the other branchlet from the axils of the upper leaves which bears few fascicles of flowers at the apex; peduncles obsolete, quadrangular, slightly villous. Bracts opposite, linear-oblong, patent, coriaceous. Calyx sessile, coriaceous, ovate, 5-partite; segments and a few subtending bracteoles ovate, obtuse, ciliate, soon fuscescent. Corolla yellow, slightly fleshy, campanulate; tube wide, longer than the calyx; limb 4-fid, villous; segments ovate, slightly acute, patent, subequal; filaments 4, subulate, patent; anthers ovate, somewhat fleshy. Ovary ovate, densely villous, bilocular, 4-ovuled; ovules oblong-cuneate, pendulous; style cylindrical, slightly longer than the tube, villous; stigma bifid, acute. Pericarp obliquely ovate, compressed, 3.8 cm. long, attenuate-acute, cuspidate with the persistent base of the style, densely and softly cano-tomentose, rotund at the base, supported by the calyx and persistent bracts; integument simple, coriaceous, 0.7 mm. thick, inside very smooth, silvery-shining. Embryo very large, coriaceous, fleshy, quite green, erect, filling the cavity entirely. Cotyledons very broad, reniform-cordate, very fleshy, smooth, shining, entire, conduplicate, the outer very obtuse the inner acute; radicle long and fleshy, very densely bearded.

Distribution: On seashores and margins of estuaries of India.

The roots are said to be aphrodisiac and the bark astringent.

The unripe seeds are used as poultice to hasten suppuration of boils and abscesses.

Bengal: Bina—; *Hindi:* Bina—; *Malayalam:* Upputti—; *Marathi:* Twai—; *New Zealand:* Maanawa—; *Sind:* Cheria, Timmer—; *Telugu:* Madachettu, Nallamada—.

LABIATAE.

Herbs rarely shrubs, often gland-dotted; branches opposite or verticillate, usually 4-angled. Leaves opposite or whorled; stipules 0. Flowers hermaphrodite, irregular, solitary, 2-nate or fascicled and axillary, or in centrifugal spicate cymes which by union in pairs form false whorls; bracts small; bracteoles usually minute, opposite. Calyx inferior, gamosepalous, persistent, subregular or irregular, 4-5-fid or distinctly 2-lipped. Corolla gamopetalous; limb 4-5-lobed or distinctly 2-lipped; lobes imbricate. Stamens adnate to the corolla-tube, 4, didynamous or only 2 perfect; anther-cells connate, separate or confluent, dehiscing longitudinally. Disk prominent. Ovary superior, deeply 4-lobed; style simple from the centre of the ovary between the lobes, erect, filiform; stigma usually 2-fid, sometimes unequally; ovules solitary in each lobe of the ovary, erect, anatropous. Fruit of 4 dry (rarely fleshy) 1-seeded nutlets at the base of the calyx, sometimes 1 or more suppressed. Seed solitary in the nutlets, small, erect; albumen scanty or 0; embryo conform to the seed; radicle inferior.—Genera 200. Species 3000.—Cosmopolitan.

A. Perfect stamens 4, rarely 2, declinate. Anthercells confluent. Ovary 4-partite. Nutlets dry. Basal scar small
- I. Upper calyx-lobe usually broadest. Corolla with 4 of the lobes equal or the 2 upper connate, the lower lip dissimilar Stamens usually exserted
  - a. Fruiting calyx deflexed, upper toothed, very large, decurrent. Stigma bifid .... OCIMUM.
  - b. Fruiting calyx suberect or declinate, tubes deeply pitted .... GENIOSPORUM.
  - c. Fruiting calyx deflexed. Corolla-tube often long. Stigma entire .... ORTHOSIPHON.
  - d. Stamens 4. Filaments connate below .... COLEUS.
  - e. Calyx-mouth oblique, upper lip usually decurved. Filaments free .... ANISOCHILUS.

f. Corolla-lip deflexed, contracted at the base .... HYPTIS.
II. Corolla 2-lipped. upper lip bifid, lower trifid .... LAVANDULA.

B. Perfect stamens 4 with the upper pair longest or 2 straight diverging or ascending. Anthers 1- or 2- celled
I. Stamens 4. Filaments straight. Anthers 1-celled
a. Calyx 5-toothed. Corolla 4-fid, lip spreading .... POGOSTEMON.
b. Calyx 5-partite. Segments plumose. Stamens included .. COLEBROOKIA.
II. Stamens 4 or 2, distant, erect or spreading. Anthers 2-celled (at least when young)
a. Calyx 10-nerved. Stamens 4. Anther-cells parallel .... MENTHA.
b. Calyx 4-5-toothed. Stamens 2. Nutlets truncate .... LYCOPUS.
c. Whorls many-flowered, capitate, involucrate. Stamens 4 .. ORIGANUM.
d. Whorls few-flowered. Stamens 4 .... THYMUS.
e. Whorls axillary, secund. Calyx 15-nerved .... HYSSOPUS.
f. Calyx 15-nerved .... HYMENOCRATER.
III. Calyx 13-nerved. Corolla 2-lipped. Stamens 2 or 4, ascending
a. Calyx 5-toothed .... MICROMERIA.
b. Calyx 2-lipped. Corolla-tube nearly straight .... CALAMINTHA.
c. Calyx 2-lipped. Corolla-tube recurved .... MELISSA.

C. Perfect stamens 2, ascending, parallel. Anther-cells linear, solitary or separated by a filiform connective
I Anther-cells equal, contiguous, pendulous from a small connective .... PEROVSKIA.
II. Anther-cells equal, distant, pendulous from a long connective .. MERIANDRA.
III. Anther-cells very unequal or solitary on a long connective .. SALVIA.
IV. Anthers connate at the margin .... ZIZIPHORA.

D. Perfect stamens 4 with the upper pair longest rarely 2, ascending or diverging. Anthers 2-celled, cells at length diverging. Ovary 4-partite
I. Calyx tubular, 5-toothed .... NEPETA.
II. Calyx 2-lipped, upper lip much the largest .... DRACOCEPHALUM.
III. Calyx 2-lipped, lateral lobes of upper lip on the face of the midlobe .... LALLEMANTIA.

E. Perfect stamens 4, ascending, lower pair longest. Calyx 1-10-nerved. Upper lip of corolla erect, hooded, lower spreading, trifid
I. Fruiting calyx tubular. Upper lip 3-, lower 2- toothed ...... BRUNELLA.
II. Calyx tubular or campanulate. Stamens included in the corolla-tube .... MARRUBIUM.
III. Anther-cells of lower stamens parallel, transverse, of upper dimidiate .... ANISOMELES.
IV. Calyx 5-toothed Anther-cells divergent .... STACHYS.
V. Calyx 5-spinous, Anther-cells parallel. Nutlets triquetrous ... LEONURUS.
VI. Calyx-lobes 5, oblong. 5-reticulate .... ROYLEA.
VII. Calyx-limb dilated, fruiting very large, membranous .... OTOSTEGIA.
VIII. Calyx, 8-10-toothed. Corolla lower lip large .... LEUCAS.
IX. Calyx 8-10-toothed. Corolla lower lip very small .... LEONOTIS.
X. Calyx-teeth 5, broad, apiculate or spinous. Nutlets bearded .. EREMOSTACHYS.
XI. Calyx 5-toothed, membranous, bearded at the mouth ...... ZATARIA.

F. Calyx 10-nerved. Stamens 4, ascending. Ovary 4-lobed
- I. Upper corolla-lip very short, bifid, with the incurved stamens exserted from the cleft .... TEUCRIUM.
- II. Upper corolla lip short, notched, usually shorter than the incurved stamens .... AJUGA.

This important Order has no poisonous members, and includes a number of medicinal or sub-medicinal plants of great value. In the lists of plants supplied to herbalists the Labiates are very strongly represented.

They mostly exhibit aromatic or bitter-aromatic, stimulant, and astringent properties; and they are used as tonics, emmenagogues, diaphoretics, and antispasmodics.

Many members yield essential oils when distilled. Alkaloids—betonicine, stachydrine, turicine—and glucosides—hyssopin—have been isolated.

OFFICIAL:—Menthol and thymol (Austria, Belgium, Denmark, France, Germany, Great Britain, Holland, Hungary, Italy, Japan, Norway, Russia, Spain, Sweden, Switzerland, Turkey, United States).

Betonica officinalis Linn. (France).

Calamintha officinalis Moench. (France).

Coleus amboinicus Lour. (Holland).

Galeopsis ochroleuca Lamarck (Austria).

Glechoma hederacea Linn. (France); *G. hederaceum* var. *grandiflora* Hoffmseg. & Link (Portugal).

Hyssopus officinalis Linn. (France, Portugal, Sweden).

Lavandula latifolia Villars (Italy); *L. officinalis* Chaix (Austria); *L. spica* Linn. (Germany, Italy, Sweden, Turkey)=*L. vera* De Cand and *L. spica* De Cand. (Portugal),=*L. officinalis* Chaix, *L. vera* De Candolle (United States),=*L. vera* DC. (Switzerland); *L. vera* DC. (Denmark, France, Great Britain, Holland, Japan, Norway, Russia) =*L. Spica* Linn. var. *angustifolia* (Spain); *L. vera* Linn. (Belgium, Spain).

Leonurus lanata Pers. & Spreng.=*Ballota lanata* Linn. (Hungary).

Majorana hortensis Moench (Austria, Switzerland).

Marrumium vulgare Linn.=*M. hamatum* Kunth. (Portugal).

Melissa officinalis Linn. (Austria, Belgium, Denmark, France, Germany, Hungary, Italy, Norway, Spain, Switzerland, Turkey)=*M. graveolens* Host. (Portugal).

Mentha aquatica Linn. (Germany, Turkey); *M. arvensis* Linn. var *vulgaris* Benth. (Japan); *M. crispa* Roth. (Great Britain); *M. piperita* Hudson (Denmark),—α, *officinalis* Sole. (Sweden); *M. Piperita* Linn. (Austria, Belgium, France, Germany, Great Britain, Holland, Hungary, Italy, Norway, Russia, Spain, Turkey, United States),—(Linn.) Hudson (Switzerland); *M. piperita* Linn. =*M. balsamea* Willd. (Portugal); *M. piperita* Sm. (Great Britain); *M. pulegium* Linn.=*Pulegium* vulgare Mill.,—var. β. villosa De Cand.=*M. tomentella* Hoffmseg. & Link (Portugal); *M. rotundifolia* Linn. var. *glabra* Brot. (Portugal); *M. spicata* Linn.=*M. viridis* Linn. (United States); *M. viridis* Linn. (Germany, Great Britain, Portugal, Turkey).

Monarda punctata Linn. (Great Britain).

Ocimum basilicum Linn. (France).

Origanum creticum Linn. (Portugal),—var. *macrostachyum* Brot.=*O. macrostachyum* Hoffmseg. & Link (Portugal); *O. dictamnus* Linn. (France); *O. majorana* Linn. (France, Holland, Italy); *O. vulgare* Linn. (Austria, Denmark, France, Norway),—var. *virens* Brot. non De Cand.=*O. virens* Hoffmseg. & Link (Portugal).

Orthosiphon stamineus Benth. (Holland).

Peltodon radicans Pohl and Benth.=*Clinopodium repens* Velloso (Portugal).

Rosmarinus officinalis Linn. (Austria, Belgium, Denmark, France, Germany, Great Britain, Holland, Hungary, Italy, Japan, Norway, Russia, Spain, Sweden, Switzerland, Turkey, United States)=*Salvia Rosmarinus* Schleid. (Portugal).

Salvia officinalis Linn. (Austria, Denmark, France, Germany, Holland, Hungary, Italy, Japan, Norway, Russia, Switzerland, Turkey)=*S. grandiflora* Ten. non Ettling (Portugal).

Satureia hortensis Linn. (France).

Teucrium Chamaedrys Linn. (France)=*Chamaedrys officinalis* Moench. (Portugal); *T. Scordium* Linn. (France).

Thymus Serpyllum Linn. (Belgium, France, Germany, Russia, Sweden, Switzerland, Turkey),—Brot. non Linn.=*T. glabratus* Hoffmseg. and Link (Portugal); *T. vulgaris* Linn. (Belgium, Denmark, France, Germany, Great Britain, Holland, Italy, Japan, Norway, Portugal, Russia, Spain, Sweden, Switzerland, Turkey); *T. Zygis* Linn. var. *sylvestris* Brot.=*T. sylvestris* Hoffmseg. and Link,—var. *variabilis* Brot.=*T. variabilis* Hoffmseg. and Link (Portugal).

OCIMUM Linn.

Strongly scented herbs, shrubs, or undershrub. Flowers small, in 6-10-flowered whorls, spicate or racemose; pedicels with recurved tips; bracts small, caducous. Calyx ovoid or campanulate, deflexed in fruit, 2-lipped; upper lip broad, flat, decurrent, erect in fruit; lower lip usually with 4 mucronate teeth, the 2 middle the largest. Corolla 2-lipped; tube short, not annulate within; upper lip subequally 4-fid; lower lip hardly longer than the upper, declinate, entire, flat or nearly so. Stamens 4, didynamous, declinate, exserted; filaments free or the lower pair connate below, naked, or the upper toothed or hairy below; anther-cells confluent. Disk entire or 3-4-lobed. Ovary 4-partite; style-lobes subulate or flattened. Nutlets 4, dry, smooth or sub-rugose, mucilaginous when moistened, enclosed in the enlarged membranous veined strongly recurved calyx.—Species 60.—Tropical and warm temperate regions.

A. Pedicels as long as or longer than the calyx
  2 lower calyx-teeth longer than the upper lip .... 4. *O. sanctum.*
B. Pedicels shorter than the calyx
  I. Lower calyx-teeth longer than the upper lip
    a. Bracts stalked ....1. *O. canum.*
    b. Bracts stalked. Fruiting calyx very shortly pedicelled .... 2. *O. basilicum.*
  II. Lower calyx-teeth shorter than the upper lip .... 3. *O. gratissimum.*

Stimulant, stomachic, antirheumatic, sudorific, and febrifuge.

The following species are used medicinally in Europe—*O. basilicum* Linn., *O. gratissimum* Linn.—; in China and Indo China—*O. basilicum* Linn.—; in Japan and Malaya—*O. crispum* Thunb.—; in the Philippine Islands—*O. basilicum* Linn., *O. gratissimum* Linn., *O. sanctum* Linn.—; in Guiana—*O. micranthum* Willd.—; in

Brazil—*O. canum* Sims., *O. gratissimum* Linn., *O. micranthum* Willd.—; in La Reunion—*O. basilicum* Linn., *O. gratissimum* Linn.—; in Ethiopia and Abyssinia—*O. gratissimum* Linn.—; in Guinea and the Gold Coast—*O. canum* Sims., *O. bassilicum* Linn., *O. viride* Willd.—; in Sierra Leone and Liberia—*O. viride* Willd.—; in South Africa—*O. canum* Sims., *O. viride* Willd.—.

The flower tops of *O. basilicum* Linn. are official in France.

1. **Ocimum canum** Sims in Bot. Mag. (1824) t. 2452. —PLATE 749A.

Herbaceous, 15-60 cm. high, much-branched; stems and branches subquadrangular, striate, the younger pubescent. Leaves 2.5-3.8 by 1-1.3 cm., elliptic-lanceolate, acute at both ends, glabrous or nearly so, entire or shallowly serrate, gland-dotted; petioles 1.3-2.5 cm. long, slender, hairy. Flowers in rather close whorls, about 6 in a whorl, in spiciform racemes 7.5-20 cm. long; bracts elliptic-lanceolate, stalked, ciliate with long white hairs; pedicels shorter than the calyx, sometimes almost 0. Calyx pubescent, 3 mm. long; upper lip suborbicular, rather broader than long, flat, shortly mucronate, reticulately veined, ciliate; lower lip with 4 lanceolate-subulate teeth, the 2 central teeth longer than the lateral and exceeding the upper lip of the calyx. Corolla 4 mm. long, white; upper lip broadly oblong, 4-toothed at the subtruncate apex, 2.5-3 mm. broad; lower lip longer than the upper, 1.25 mm. broad, oblong, obtuse. Stamens much exserted; filaments slender, the 2 upper with a tooth at the base. Style exserted beyond the filaments. Nutlets 1.25 mm. long, ellipsoid, black.

Distribution: Plains and lower hills of India, Ceylon.—Java, W. Asia, tropical Africa, Madagascar, cultivated in America.

Among the Santals, during fever when the extremities are cold, the leaves made into a paste are applied to the finger and toe-nails. The same preparation is used as a cure for parasitical diseases of the skin (Campbell).

In Madagascar, the leaves and the seeds are considered aromatic, tonic, febrifuge, anticatarrhal, expectorant, sternutatory, antirheumatismal. For malaria the seeds are ground in an infusion of the

leaves. The juice and the powder obtained by pounding together the seeds and the leaves are taken as an errhine in migraine.

It is a common cure for fever on the Gold Coast, when it is boiled and the water is drunk. Sometimes the juice may be squeezed into the patient's eyes, or the plant put in his bath water. At Accra, the plant is used to cure dysentery.

For hæmorrhage from the nose, the Sutos either inhale the smoke from burning the dried leaf or apply an ointment made with the powdered leaf.

Awuna: Defetsui—; *Canarese:* Nayitulasi, Ramatulasi—; *Madagascar:* Kiranjay—; *Madras:* Nayttulasi—; *Malayalam:* Katturamatulasi—; *Sadani:* Garaighasi—; *Sanskrit:* Ajaka, Arjaka, Gambhira, Gandhapanirjjaka, Jambira, Kathinjara, Kshudraparna, Kshudratulasi, Kuthera, Mukharjaka, Ugragandha—; *Santali:* Bharbhari—; *Sinhalese:* Hintalla—; *Suto:* Mmaywatwane—; *Tamil:* Ganjamkorai—; *Telugu:* Kukkatulasi—; *Twi:* Aimen—.

2. **Ocimum basilicum** Linn. Sp. Pl. (1753) 597.—PLATE 750.

An erect branching herb, 0.6-0.9 m. high, glabrous or more or less hispidly pubescent. Stems and branches green or sometimes purplish. Leaves 2.5-5 cm. or more long, ovate, acute, entire or more or less toothed or lobed; base cuneate, entire, petiole 1.3-2.5 cm. long. Whorls densely racemose, the terminal raceme usually much longer than the lateral ones; bracts stalked, shorter than the calyx, ovate, acute. Calyx 5 mm. long, enlarging in fruit, very shortly pedicelled; lower lip with the 2 central teeth longer than the rounded upper lip. Corolla 8-13 mm. long, white pink or purplish, glabrous or variously pubescent. Stamens slightly exserted, upper filaments toothed at the base. Nutlets about 2 mm. long, ellipsoid, black and pitted.

Distribution: Indigenous on the lower hills of the Punjab. Cultivated throughout the greater part of India, Ceylon, Burma.

The plant is pungent and dry; stomachic, anthelmintic, alexipharmic, antipyretic; improves the taste; useful in diseases of the

heart and blood, biliousness, "kapha" and "vata", leucoderma, itch; causes burning sensation.—The seeds allay thirst (Ayurveda).

The plant has a sharp bitter hot taste; diuretic, emmenagogue; useful in diseases of the heart and brain, chronic pain in the joints, asthma, inflammations, enlarged spleen.—The juice gives lustre to the eye; good for toothache, earache, headache; mixed with camphor it stops nasal hæmorrhage (Yunani).

Diaphoretic and expectorant properties are ascribed to this plant; which is considered digestive and pectoral in La Reunion.

The roots are used for the bowel complaints of children.

The leaves are useful in the treatment of croup, for which the juice warm with honey is given.

The juice of the leaves forms an excellent nostrum for the cure of ringworm, and the bruised leaves for scorpion-stings. They are a popular remedy for snake-bite and are recommended by Charaka and Bapat.

The flowers possess stimulant, diuretic and demulcent properties.

The seeds are mucilaginous and cooling, given in infusion in gonorrhœa, diarrhœa, and chronic dysentery. A cold infusion is said to relieve the after-pains of parturition.

The seeds washed and pounded are used in poultices for unhealthy sores and sinuses. They are also given internally with sherbet in cases of habitual constipation and in internal piles. The juice is dropped into the ears for the cure of ear-ache and dulness of hearing.

In Guinea, the decoction of the leaves and the stems is given in fevers, neuralgia, catarrh, and renal troubles; it is also used as a lotion for sore eyes.

In Annam, an infusion of the plant is considered anti-emetic and anti-diarrhæic. It is given for cephalalgia and gouty joints, and used as a gargle for foul breath. An infusion of the seeds is given in fevers. The seeds are chewed in cases of snake-bite, one portion is swallowed and the other portion applied to the bitten part.

The leaf is not an antidote to snake-venom. In the treatment of snake-bite it is equally useless as a collyrium, an errhine, and a

local application to the part bitten (Mhaskar and Caius). Nor is the leaf an antidote to scorpion-venom (Caius and Mhaskar).

The seeds yield an oil which has been studied by Ramaswamiayyar and Patwardan (17th Indian Sc. Congress; Allahabad, 1930). The essential oil from the leaves has also been examined (*Journ. Chem. Soc.*, 1897; *Journ. Soc. Chem. Ind.*, 1904).

Annam: Huong nhung, Nhat thong chi, Rau e lon trong, Rau e tia, Rau e trang—; *Arabic:* Asabaulfeteyat, Badarwaj, Badruj, Buklutulzub, Hebak, Rihan, Shahasfaram—; *Bengal:* Babuitulsi, Debunsha, Khubkalam, Pashanabeddie—; *Canarese:* Ramkasturi, Sajjebiya—; *Catalan:* Alfabrega de fulla ampla, Alfabrega de fulla petita—; *Chinese:* Hsun Ts'ao, Lo Le—; *Deccan:* Salzat, Subjah, Subze, Tirunitru—; *Dutch:* Basilienkruid, Basilikum—; *English:* Basil, Common Basil, Common Sweet Basil, Sweet Basil—; *French:* Basilic, Basilic des cuisinieres, Basilic cultivé, Basilic aux sauces, Grand basilic, Herbe royale—; *Fulah:* Soukora—; *German:* Basilienkraut, Basilikum, Kœnigskraut—; *Greek:* Basilikos, Okimon—; *Gujerati:* Damaro, Nasabo, Sabje—; *Hausa:* Deidoya, Dodoya, Doidoya—; *Hindi:* Babuitulsi, Babul, Bahari, Kalitulsi, Barbar, Niyakshbo, Rihan, Sabzah, Tukhmerihan—; *Italian:* Basilico, Bassilico, Ocimo, Ozzimo—; *Kathiawar:* Marvo—; *Kwang Tung:* Hiang Hoa Tsao—; *Languedoc:* Embaimo—; *La Reunion:* Grand basilic—; *Las Bela:* Drarkhatori—; *Malay:* Ruku, Selasih antan—; *Malayalam:* Pachcha, Tirunitru—; *Malinke:* Sossoguena, Souguenfira—; *Marathi:* Marva, Sabja, Sabza, Tukhamariya—; *Peking:* Gai K'ang—; *Persian:* Dabanshah, Firanjmushk, Nazbu, Rthanedash, Turehkorasani, Ungushtkunizuekan—; *Polish:* Bazylik—; *Porebunder:* Marvi, Takmario—; *Portuguese:* Mangericao—; *Punjab:* Babri, Baburi, Furrunjmushk, Nigand, Niyazob, Panr, Rehan, Tulsi—; *Roumanian:* Busuioc—; *Russian:* Bazilik—; *Sanskrit:* Ajagandhika, Apetarakhsasi, Asurasa, Barba, Barbara, Barbari, Karahi, Kharapushpa, Manjariki, Munjariki, Surabhi, Surasa, Tulasidvesha, Tungi, Varvara—; *Santali:* Bharbari, Dimbubaha, Malibuha—; *Serbian:* Bosilek, Bosiliak—; *Sind:* Nazbo, Sabajhi—; *Sinhalese:* Sawandatala, Suwandutala—; *Spanish:* Albahaca fina, Albahaca de hoja ancha—;

Tagalog: Solasi, Sulasi—; *Tamil:* Tirnutpatchi, Tirunitru—; *Telugu:* Bhutulasi, Rudrajada, Vepudupachha, Vibudipatri—; *Tongking:* Hung gioi—; *Urdu:* Janglitulasi—; *Uriya:* Dhalatulasi—; *Visayan:* Bonac, Calooy, Canela—.

3. **Ocimum gratissimum** Linn. Sp. Pl. (1753) 1197.—PLATE 749B.

Shrubby, perennial, 1.2-1.8 m. high, much-branched, woody below; stem and branches subquadrangular, the young ones pubescent. Leaves 6.3-12.5 by 3.8-5.7 cm., elliptic-lanceolate, acute, coarsely crenate-serrate, pubescent on both sides, gland-dotted, base cuneate petioles 2.5-6.3 cm. long, slender, more or less pubescent. Flowers in simple or branched rather short racemes, in tolerably close whorls; rhachis quadrangular, softly pubescent; bracts sessile, longer than the calyx, acuminate from a broad ovate base, decussate and squarrose in the young inflorescence, ciliate; pedicels shorter than the calyx, softly pubescent. Calyx 3 mm. long in flower, becoming twice as long in fruit, pubescent and glandular; upper lip rounded, veined, scarcely mucronate, curved upwards in fruit, longer than the lower; lower lip strongly nerved, the 2 central teeth short, subulate, the lateral teeth shorter and broader, lanceolate. Corolla 4 mm. long, pale greenish yellow, pubescent outside; upper lip 3 mm. broad with 4 rounded teeth; lower lip longer than the upper, 1.25 mm. broad. Stamens exserted; upper filaments with a bearded tooth at the base. Nutlets 1.5 mm. diam. subglobose, rugose, brown.

Distribution: Throughout India, often cultivated, Ceylon.—Java, tropical Africa. Native country not known for certain.

The plant has a pungent taste with some flavour; heating, alexiteric; useful in vomiting, fits, "vata" and "kapha", skin diseases, erysipelas, inflammations, strangury; causes insomnia (Ayurveda).

The plant has a bitter sharp taste; carminative, aphrodisiac; useful in diseases of the brain, the heart, the liver, and the spleen; removes foul breath; strengthens the gums; good for griping and piles (Yunani).

Aromatic baths of fumigations prepared with the plant are advised in the treatment of rheumatism and paralysis. In the aphthæ of children a strong decoction has been found effectual.

A decoction of the leaves is of value in cases of seminal weakness, and is an esteemed remedy in gonorrhœa.

The seeds are given in headaches and neuralgia.

Considered digestive and pectoral in La Reunion. On the Gold Coast, the leaves are mashed and used as an enema by newly delivered women. It is also used for young infants.

A very popular remedy in Madagascar. It is considered aromatic, digestive, tonic, pectoral, antiemetic, antispasmodic, antineuralgic. The Betsileo chew the leaves for toothache, and sniff the juice of the leaves or the powdered seeds in headache.

The inflorescence has been prescribed for snake-bite (Vrindamadhava); but the plant is not an antidote to snake-venom (Mhaskar and Caius).

Arabic: Furanjmishk—; *Bengal:* Ramtulshi, Ramtulsi—; *Betsileo:* Romba—; *Bombay:* Ramatulasa, Rantulsi, Tulsi—; *Deccan:* Ramtulsi—; *English:* Large Basil, Lemon Basil, Shrubby Basil—; *Ewe:* Daiblorsi—; *Gujerati:* Avachibavachi, Ramtulasi—; *Hindi:* Bantulsi, Malatulsi, Ramtulsi—; *La Reunion:* Baumier, Gros braume—; *Malayalam:* Kattutrittavu, Ramatulasi—; *Marathi:* Ramatulasi, Ranatulasu—; *Mundari:* Dimbubaha—; *Persian:* Palangmishk—; *Porebunder:* Ramtulasi—; *Punjab:* Banjere—; *Sadani:* Dimbu—; *Sanskrit:* Ajaka, Doshakleshi, Nidralu, Ramatulasi, Shophahari, Sugandhi, Sukshmapatraka, Sumukha, Suprassanaka, Suvakra, Vanabarbarika, Vishaghna, Vriddhatulasi—; *Sinhalese:* Gastala, Otala—; *Tamil:* Elumichantulasi, Peruntulasi—; *Tankay:* Romba—; *Telugu:* Nimmatulasi, Ramatulasi—; *Urdu:* Ramtulasi—; *Uriya:* Ramotulosi, Sondabhogohulono—; *Visayan:* Coloncogon—.

4. **Ocimum sanctum** Linn. Mant. I (1767) 85.—Plate 751.

Annual, 30-60 cm. high, much-branched; stems and branches usually purplish, subquadrangular, sometimes woody below, clothed with soft spreading hairs. Leaves 2.5-5 by 1.6-3.2 cm., elliptic-oblong, obtuse or acute, entire or serrate, pubescent on both sides,

minutely gland-dotted, base obtuse or acute; petioles 1.3-2.5 cm. long, slender, hairy. Flowers in racemes 15-20 cm. long in close whorls; bracts nearly 3 mm. long and almost as broad as long, broadly ovate with a long slender acumen, ciliate; pedicels longer than the flowering calyx, slender, pubescent. Calyx 3-4 mm. long in flower, pubescent, reaching 5 mm. long in fruit; upper lip broadly obovate or sub-orbicular, much reflexed, very shortly apiculate; lower lip longer than the upper, the teeth lanceolate at the base, the 2 lateral with short straight, the 2 central with long slender awns which project beyond the upper lip and are much curved upwards. Corolla 4 mm. long, purplish; upper lip pubescent on the back. Stamens exserted; filaments slender, the upper pair with a small bearded appendage at the base. Nutlets 1.25 mm. long, broadly ellipsoid, nearly smooth, yellow with small black markings.

Distribution: Throughout India, cultivated but doubtfully indigenous.—Malay Archipelago, Australia, W. Asia, Arabia.

The plant has a pungent, bitter, taste; heating, stomachic, cholagogue, anthelmintic, alexiteric, antipyretic; useful in diseases of the heart and blood, leucoderma, strangury, "kapha" and "vata", asthma, bronchitis, vomiting, foul smells, lumbago, pains, hiccough, painful eye, purulent discharge of the ear; causes burning sensation (Ayurveda).

The root is given in decoction as a diaphoretic in malarial fevers.

The leaves have expectorant properties, and their juice is used in catarrh and bronchitis. This preparation also is applied to the skin in ringworm and other cutaneous diseases. An infusion of the leaves is used as a stomachic in the gastric disorders of children, and in hepatic affections. The dried leaves are powdered and employed as a snuff in ozæna. They are also an effectual means of dislodging maggots. The juice dropped into the ear is said to be a good remedy for earache.

The seeds are mucilaginous and demulcent, and are given in disorders of the genito-urinary system.

In Ceylon, the herb is used in decoctions for cough and catarrh, sometimes chewed as a substitute for betel.

The fresh roots are ground with water and applied to the stings of wasps and bees and the bites of worms and leeches. The bruised fresh roots, stems, and leaves are applied to the bites of mosquitoes (Roberts).

Every part of the plant finds its application in the treatment of snake-bite (Charaka, Sushruta, Vagbhata, Brihannighantaratnakara, Bhavaprakasha, Yogaratnakara, Rasaratnakara, Bapat, Roberts) and scorpion-sting (Charaka, Sushruta, Vagbhata, Rasaratnakara, Vaidyavinoda, Bhaishajyaratnavali, Chakradatta); but every part of it is equally useless in the antidotal and symptomatic treatment of snake-bite (Mhaskar and Caius) and scorpion-sting (Caius and Mhaskar).

The juice of the leaves or decoction of the same is considered to possess diaphoretic, antiperiodic and stimulating expectorant properties. A compound decoction of *O. sanctum*, *Tinospora cordifolia*, and *Evolvulus alsinoides* was given in cases of malarial fever with no benefit (Koman).

Badaga: Kapputulasi—; *Bengal:* Kalatulsi, Kural, Tulshi, Tulsi—; *Bombay:* Tulas, Tulasa—; *Burma:* Lun—; *Canarese:* Kalatulasi, Karitulasi, Sritulasi, Tulasi—; *Deccan:* Tulsi—; *English:* Holy Basil, Monk's Basil, Rough Basil, Sacred Basil—; *Gujerati:* Talasi—; *Hindi:* Baranda, Kalatulsi. Tulsi, Varanda—; *Ilocano:* Biday—; *Konkani:* Tulsi—; *Malayalam:* Krishnatulasi, Kunnakam, Nallatrittavu, Punya, Sivatulasi, Surasam, Trittavu, Tulasi—; *Marathi:* Tulasa, Tulasichajadha—; *Pampangan:* Locoloco—; *Philippines:* Albahaca—; *Portuguese:* Mangericao—; *Punjab:* Bantulsi, Tulsi—; *Sanskrit:* Ajaka, Arjaka, Amrita, Apetarakshasi, Bahupatri, Bharati, Bhutaghni, Bhutaka, Bhutapatri, Brinda, Devadundubhi, Divya, Gandhaharini, Gauri, Gramya, Haripriya, Kathinjara, Kayastha, Krishnamula, Krishnatulasi, Kutheraka, Laxmi, Madhavi, Malashreshtha, Manjari, Papaghni, Parnasa, Patrapushpa, Pavani, Pavitra, Pretarakshasi, Punya, Sarasa, Shrikrishnavallabha, Shyama, Subhaga, Sugandha, Sulabha, Surabhi, Suradundubhi, Surasa, Suravallari, Suravalli, Surejya, Suvaha, Tivra, Tridashamanjari, Tulasi, Vaishnavi, Vishnupatni, Vishnuvallabha, Vrinda—; *Sinhalese:* Madurutala, Mudurutulla—; *Tagalog:* Balanoi, Locoloco—; *Tamil:* Alangai,

Karuttulasi, Kulimittan, Kullai, Kumuli, Malgodai, Malmurugu, Mudi, Nediyon, Pirundam, Sirttulay, Surasa, Surasam, Suriyagarandai, Savadugundi, Suvi, Tulasi, Tulavam, Tulay—; *Telugu:* Brynda, Gaggera, Krishnatulasi, Kukkatulasi, Nallagaggera, Nallatulasi, Tellatulasi, Tulasi—.

Geniosporum Wall.

Erect or procumbent glabrous or pubescent herbs. Flowers small, in many flowered whorls forming long terminal spicate racemes; bracts often coloured. Calyx ovoid in flower, tubular in fruit, suberect or declinate; upper tooth broadest, flat, obtuse, not decurrent; lateral pair of teeth free or connate with the upper; lowest pair free or connate. Corolla 2-lipped; tube short; upper lip 4-fid; lower lip declinate, entire. Stamens 4, didynamous, declinate; filaments free, inappendiculate. Disk swollen, gibbous. Ovary 4-partite; style shortly 2-fid, the arms flattened. Fruit of 4 dry ovoid or oblong, smooth or punctulate nutlets.—Species 15.—Africa, Madagascar, Indo-Malaya.

The genus is therapeutically inert.

1. **Geniosporum prostratum** Benth. in Pl. As. Rar. II (1831) 18.—Plate 752A.

Annual; stems many from a woody rootstock, slender, either diffuse, ascending, prostrate and rooting, or quite erect, glabrous or more or less hispid with weak deflexed hairs. Leaves in distant pairs, 2.5-5 by 0.8-2 cm., subsessile, obovate-lanceolate or linear-lanceolate, acute or subacute, shallowly serrate or distantly toothed, with a few hairs on both sides, base tapering. Flowers minute, in many-flowered close or distant whorls, in slender racemes 5-15 cm. long; bracts 3 mm. long, thick, broadly ovate, acuminate, pubescent, gland-dotted; pedicels usually longer than the calyx. Fruiting calyx 3 mm. long; hairy outside and with a ring of hairs in the throat; upper lip variable in size, oblong, subtruncate, mucronate; lateral teeth triangular, acute; the 2 lower teeth lanceolate, awned. Corolla pink or white, 3 mm. long, hairy; tube 1.5 mm. long; upper lip with 4 triangular teeth; lower lip obovate, obtuse, rather longer than the

upper. Stamens exserted. Nutlets 0.85 mm. long, ellipsoid, compressed, smooth, brownish black.

Distribution: Carnatic, on sandy ground, especially near the sea, Ceylon.

The plant is regarded as a febrifuge in Pondicherry.
Pondicherry: Nazelnagai—.

Orthosiphon Benth.

Undershrubs or shrubs. Flowers racemose in 6- or fewer-flowered whorls; bracts small. Calyx ovoid, campanulate or tubular, deflexed in fruit; upper tooth broad, membranous, the margins decurrent on the tube; lateral and lower teeth distinct or shortly connate, usually subulate. Corolla 2-lipped; tube often slender, straight or incurved; upper lip 3-4-fid; lower entire, concave. Stamens 4, declinate, didynamous; filaments free, not appendaged at the base; anther-cells confluent. Disk usually gibbous. Ovary 4-partite; style with a small capitate or clavate entire or notched stigma. Fruit of 4 dry ovoid or globose nutlets, smooth or nearly so; basal scar small. —Species 50.—Indo-Malayan, tropical Africa.

O. stamineus Benth. is used medicinally in the Malay Archipelago. The leaves are official in Holland.

1. **Orthosiphon stamineus** Benth. in Wall. Pl. As. Rar. II (1831) 15.—Plate 752B.

Undershrubs, slender, glabrous or pubescent. Stems 30-60 cm., 4-angled. Leaves in distant pairs, 5-10 cm., narrowed into the petiole, ovate, acuminate, coarsely toothed, base cuneate. Racemes very lax-flowered. Calyx 4 mm., campanulate, 2 lower teeth subulate. Corolla 2.5 cm., glabrous, white or purplish. Corolla-tube very slender, thrice as long as the calyx. Filaments far exserted, capillary, twice as long as the corolla. Nutlets broadly oblong, compressed, rugulose.

Distribution: Assam, Burma, Nicobar Islands, Deccan, Anamalais.—Malay and Philippine Islands, Australia.

In Java, the leaves are made into a tea and used in the treatment of diseases of the kidneys and bladder.

English: Java Tea—; *French:* The'de Java—; *Malay Archipelago:* Koemis Koetjing, Remock djoeng—.

COLEUS Lour.

Herbs or undershrubs. Flowers in lax or close paniculate or racemose 6-10-flowered cymes. Calyx 2-lipped; upper lip widest, not decurrent. Corolla 2-lipped; tube exserted, decurved; throat equal or obliquely swollen; upper lip short, broad, 4-fid, recurved; lower lip much longer, entire, boat-shaped, stipitate or narrowed at the base. Stamens 4, didynamous, connate below into a sheath separate from the corolla; anther-cells usually confluent. Disk enlarged in front. Ovary 4-partite; style subequally 2-fid. Fruit of 4 orbicular or ovoid smooth dry nutlets; basal scar small.—Species 150.—Palæotropics.

C. amboinicus Lour. and *C. atropurpureus* Benth. are used medicinally in the Philippine Islands, *C. amboinicus* Lour. in the Malay Archipelago, and *C. bojeri* Benth. in Madagascar.

The leaves of *C. amboinicus* Lour. are official in Holland.

1. **Coleus amboinicus** Lour. Fl. Coch. 372.—*C. aromaticus* Benth. in Wall Pl. As. Rar. II (1831) 15; Wight Ill. II, t. 175.—PLATE 753B (under *C. aromaticus* Benth.).

A perennial herb, shrubby below, hispidly villous or tomentose. Stem 30-90 cm., fleshy. Leaves 2.5-5 cm., petioled, broadly ovate or cordate, crenate, fleshy, very aromatic. Flowers shortly pedicelled, 3 mm. long, whorls distant, densely many-flowered. Upper calyx-lip ovate, acute, membranous, lower acuminate. Corolla pale purplish, tube short, throat inflated, lips short. Stamens shortly exserted. Fruiting calyx suberect.

Distribution: Cultivated throughout India, Ceylon and elsewhere.

The leaves are said to have a specific action on the bladder and to be useful in urinary diseases, vaginal discharges, etc. The juice mixed with sugar is given in cases of colic in children, and acts as a powerful aromatic carminative.

In spite of its intoxicating properties the people of Bengal employ it in colic and dyspepsia.

In Ceylon, a decoction of the leaves is given for asthma, chronic coughs, etc.

In Cochin China, the juice of the leaves is considered carminative and is given to children suffering from wind colic. The decoction is given for asthma, chronic bronchitis, epilepsy, and convulsions.

Bengal: Paterchur—; *Bombay:* Owa, Pathorchur, Pathurchur—; *Hindi:* Pathorchur—; *Malay Archipelago:* Daoen Koetjing, Djinten—; *Marathi:* Pathurchur—; *Philippines:* Oregano—; *Sanskrit:* Pashanabhedi—; *Sinhalese:* Kapprawalliya—; *Tagalog:* Suganda—.

ANISOCHILUS Wall.

Herbs or undershrubs. Flowers small, in dense oblong 4-angled or cylindric spikes; bracts caducous. Calyx suberect, inflated below the middle, 2-lipped or 5-toothed (rarely 1-lipped); upper lip entire and deflexed, or short and minutely 3-lobed; lower lip short, truncate, obscurely toothed or 0. Corolla 2-lipped; tube slender below, inflated at the throat; upper lip short, entire or 3-4-fid; lower elongate, concave. Stamens 4, didynamous, declinate; filaments free. Disk lobed. Ovary 4-partite; style 2-fid at the apex. Fruit of 4 ovoid or suborbicular smooth dry nutlets; basal scar small.—Species 20.—Tropical Asia, Africa.

The genus is therapeutically inert.

1. **Anisochilus carnosus** Wall. Pl. As. Rar. II (1831) 18; Wight Ill. t. 176b, fig. 1.—PLATE 753A.

Annual, erect, 30-60 cm. high; stem stout, bluntly quadrangular, glabrous or finely pubescent, often tinged with red. Leaves 2.5-6.3 by 1.3-4 cm., broadly ovate, obtuse, crenate, somewhat fleshy, glabrous or slightly pubescent above, usually pubescent beneath, base subcordate or rounded; petioles 1.3-3.2 cm. long. Flowers sessile, in dense ultimately cylindric spikes 1.3-3.8 cm. long, elongating in fruit; peduncles long, slender; bracts 3 mm. long, broadly ovate, acuminate, pubescent and glandular, ciliate, veined, caducous. Calyx pubescent, 5 mm. long in flower, sometimes 8 mm. long in fruit; upper lip in

fruit ovate-lanceolate, acute, ciliolate, decurved over the lower lip and closing the calyx-mouth; lower lip truncate, the tip very membranous, ciliate, turned back and appressed on the tube by the pressure of the upper lip. Corolla pale purple, 1 cm. long, pubescent outside; tube narrow below, inflated above; upper lip short, erect, with very shallow rounded lobes; lower lip 4 mm. long, concave. Nutlets 1.25 mm. diam., suborbicular, compressed, smooth, polished, brown.

Distribution: W. Himalaya, Bengal, Central India, N. Circars, Deccan, Carnatic, Ceylon, Ava.

The plant is a mild stimulant, expectorant, particularly useful in the cough of childhood.

The fresh juice of the leaves mixed with sugar-candy is given by the Tamil doctors in cynanche; and mixed with sugar and gingelly-oil, is used as a cooling liniment for the head.

Bombay: Choraonva, Kapurli—; *Canarese:* Doddapatri—; *Deccan:* Ajvankapatta, Panjirikapatta—; *Hindi:* Panjirikapat, *Gujerati:* Ajama, Ajmanupatru, Ubhoratavelio—; *Malayalam:* Chomara, Kattukurkka, Kurkka, Patukurkka—; *Marathi:* Choraonva, Kapurli—; *Sinhalese:* Galkapurawalliya—; *Tamil:* Karppuravalli—; *Telugu:* Karpuravalli, Omamuaku, Rogachettu—.

Lavandula Linn.

Herbs or shrubs. Leaves incised or entire. Flowers in 2-10-flowered whorls collected in simple or branched spikes; bracts persistent. Calyx erect, ovoid-tubular, shortly equally 5-toothed, 13-15-nerved. Corolla blue or purple (rarely white), oblique, 2-lipped; upper lip 2-fid; lower lip 3-partite with spreading lobes. Stamens 4, didynamous, declinate, included; filaments free; anther-cells confluent. Disk equally 4-lobed, the nutlets dorsally attached to the lobes leaving a large areole on separation. Ovary 4-partite; style shortly 2-fid, the lobes flattened. Fruit of 4 dry smooth nutlets; basal scar slightly oblique.—Species 20.—Mediterranean to India.

Aromatic, stimulant and carminative, expectorant and antispasmodic.

L. dentata Linn., *L. spica* DC., *L. stoechas* Linn., *L. vera* DC. are used medicinally in Europe.

Official :—The flowers of *L. Latifolia* Villars (Italy), *L. officinalis* Chaise (Austria), *L. spica* Linn. (Italy, Germany), *L. vera* DC. (Denmark, France, Holland, Japan, Norway),—*L. spica* Linn. var. *angustifolia* (Spain).

The oil from *L latifolia* Villars (Italy), *L. spica* Linn. (Germany, Italy, Turkey),=*L. vera* DC. (Switzerland),=*L. vera* De Cand. and *L. spica* De Cand. (Portugal),=*L. officinalis* Chaix=*L. vera* De Candolle (United States), *L. vera* DC. (Great Britain, Japan, Russia), *L. vera* Linn. (Belgium, Spain).

1. **Lavandula bipinnata** O. Ktze. Rev. Gen. Pl. pt. II, 521. —*L. Burmanni* Benth. Lab. Gen. & Sp. (1833) 151; Wight Ic. t. 1438.

A slender erect herb; stems simple or branched, leafy, quadrangular, finely pubescent. Leaves sessile or nearly so, 3.8-10 cm. long and as broad as long, pinnatipartite or very deeply pinnatisect, the lobes linear, entire, cut or toothed, obtuse or subacute, 1.5-3 mm. broad (rarely broader), glabrous or pubescent above, pale and pubescent beneath. Flowers in spikes which are simple or with few or many branches, sometimes umbellately arranged; bracts finely pubescent, persistent, 6-8 mm. long with a short broadly-ovate, strongly nerved base, produced into a long capillary awn at the apex. Fruiting calyx 5 mm. long, tubular, slightly curved, clothed with fine hoary pubescence; teeth equal, lanceolate, acute, with penicillate tips. Corolla blue or white, pubescent outside, exceeding 1.3 cm. long; tube 8 mm. long, the lower half very slender, the upper half slightly dilated; upper lip 3 mm. long, oblong, with 2 short rounded lobes; lower lip 5 partite, the middle lobe oblong, rounded, more than twice as long as the ovate obtuse lateral lobes. Nutlets 2 by 1.25 mm., oblong-ellipsoid, smooth, very mucilaginous when wetted, black when ripe, with a large white oblong areole on the dorsal side.

Distribution: Chota Nagpur, Mt. Abu, Jubbulpore, Konkan, Khandesh, Deccan.

It is reported that the villagers and shepherds of the Barda Hills in Kathiawar use the plant as a medicine.

The plant is supposed to act as an antidote against snake-poison. The roots are rubbed with water and the solution or the paste is applied over the sting or the bite of poisonous animals. The powdered leaves are given for inhalation to the person who has been bitten by a serpent in order to prevent him from falling into sleep.

The oils from the flowers and the leaves have been examined by Kanga (*Journ. Ind. Inst. Sc.*, I).

Gujerati: Aasmanigalgoto, Sarpnocharo—.

Pogostemon Desf.

Herbs or undershrubs. Leaves opposite (rarely ternate). Flowers small, in simple or panicled spikes or contracted racemes formed of many dense-flowered subcapitate cymes (whorls). Calyx subequally 5-toothed. Corolla 2-lipped, 4-lobed; upper lip 3-lobed, the middle lobe often longer and narrower than the lateral ones; lower lip flat, spreading, narrow, entire. Stamens 4, exserted, subequal, straight or declinate; filaments usually bearded; anther-cells confluent. Ovary 4-partite; style shortly 2-fid, the lobes equal, subulate. Fruit of 4 smooth ovoid or ellipsoid dry nutlets, one of the faces often angled.—Species 35.—Indo-Malayan.

A. Stems hoary-pubescent or villous
  1. Calyx-teeth short .... 1. *P. plectranthoides.*
  2. Calyx-teeth nearly as long as the tube .... 2. *P. purpurascens.*
B. Stems glabrous or nearly so, smooth and shining
  Leaves with an odour of black currants .... 3. *P. parviflorus.*

The genus is not therapeutically defined.

1. **Pogostemon plectranthoides** Desf. in Mém. Mus. Paris II (1815) 155, t. 6 (*plectrantoides*); Bot. Mag. t. 3238.—Plate 754.

A large branched erect bush; branches round or subquadrangular, the young ones hoary-pubescent, often dark purple. Leaves 5-12.5 by 3.2-7 cm., ovate, acute, doubly serrate, pubescent or nearly glabrous, base rounded or cuneate; petioles 1.3-3.2 cm. long. Flowers in dense hoary-pubescent or villous terminal and axillary stout spikes forming a paniculate inflorescence; whorls many-flowered, close; bracts reaching 8 mm. long, foliaceous, broadly ovate, acute,

pubescent and ciliate, enclosing a fascicle of sessile flowers intermingled with membranous bracteoles of various sizes, mostly linear-lanceolate, often tinged with purple. Calyx 4-5 mm. long, slightly obconic, pubescent and glandular, often tinged with purple at the apex; teeth lanceolate, acute, ciliate. Corolla 8 mm. long, pink or white; tube slender, 5 mm. long, cylindric; upper lip 4 mm. long, 3-lobed, the middle lobe narrow, linear, obtuse, longer than the 2 short broad obtuse lateral lobes; lower lip narrow, 2.5-3 mm. long, ovate-oblong, obtuse, entire. Stamens much exserted; filaments bearded. Nutlets 0.85 mm. long, broadly ellipsoid, the inner face angular, the dorsal face rounded, smooth, shining, brown-black when ripe.

Distribution: W. Himalaya, Lower Bengal, Upper Burma, Bihar, Gujarat, Konkan, N. Kanara, N. Circars, Deccan.

The properties are said to be the same as those of *P. parviflorus*.

Deccan: Pangla—; *Garhwal:* Lujra—; *Haldwani:* Kalabasinga—; *Konkani:* Pangla—; *Ramnagar:* Rudera—; *Telugu:* Kusurijang—; *Uriya:* Dumobadotoko, Gondripulu—.

2. **Pogostemon purpurascens** Dalz. in Kew Journ. Bot. II (1850) 337.—Plate 755B.

An erect branched herb; stems and branches quadrangular, furrowed, softly hairy with spreading hairs. Leaves membranous, often tinged with purple, 6.3-18 by 3.2-9 cm., ovate, acute, more or less deeply cut, often doubly serrate, softly hairy on both sides, base cuneate; petioles 1.3-5 cm. long. Flowers in long-pedunculate villous spikes 7.5-20 cm. long; whorls many-flowered, globose, the upper whorls approximate, the lower usually separate; bracts 5 mm. long, oblong-lanceolate, acute, sometimes slightly falcate, pubescent, penicillate at the tip, ciliate, veined. Calyx 5 mm. long, pubescent; tube pentagonal; teeth nearly equalling the tube, lanceolate, acute, 3-nerved, ciliate and with penicillate tips. Corolla 6 mm. long; tube 4-5 mm. long, white; upper lip purple with white margin, 3-lobed, the middle lobe oblong, obtuse, longer and narrower than the 2 obtuse lateral ones; lower lip, white, deltoid-ovate, acute. Stamens bearded. Nutlets 0.85 mm. long, ovoid, compressed, the

inner face angular, the dorsal face rounded, smooth, polished, black when ripe.

Distribution: Konkan, Deccan, N. Kanara, S. Kanara, Mysore, W. Coast and W. Ghats of Madras Presidency.

Used as a substitute for *P. parviflorus.*

3. **Pogostemon parviflorus** Benth. in Wall. Pl. As. Rar. I (1830) 31.—PLATE 755A.

Suffruticose, 1.2-1.8 m. high; stem and branches obtusely quadrangular, usually purple, smooth and shining or sometimes slightly pubescent. Leaves with a strong odour of black currants when bruised, 7.5-18 by 3.8-9 cm., broadly ovate, acute or acuminate, coarsely and irregularly doubly-toothed, glabrous or slightly pubescent, base cuneate; petioles 1.6-5 cm. long. Flowers in dense pubescent spikes forming pyramidal lax panicles; whorls many-flowered, usually close; bracts pubescent and ciliate, the outer 6 mm. long, foliaceous, ovate, acute, the inner membranous, linear-lanceolate, often subfalcate, about equalling the calyx. Calyx 4 mm. long, glandular and pubescent; tube pentagonal; teeth 1.25 mm. long, lanceolate. Corolla-tube 3 mm. long; upper lip white, shot with purple, 3-lobed, the middle lobe oblong, rounded, longer and narrower than the 2 rounded lateral ones; lower lip entire, white. Stamens exserted; filaments purple except just below the anthers, where they are white, bearded with purple hairs. Style purple, the tips of the apical lobes usually white. Nutlets 0.85 mm. long, ellipsoid, the the inner face angular, the dorsal face rounded, smooth and shining, black.

Distribution: More or less tthroughout India.

The fresh leaves, bruised, are applied as a cataplasm in order to clean wounds and promote healthy granulation. In Satara, the juice is given in colic and fever.

The root is a reputed remedy for hæmorrhage, and has been given successfully in uterine hæmorrhage (C. J. F. Gracias).

The roots are used in the Ratnagiri District as an antidote for the poison of *Echis carinata,* a common snake in that district.

The plant, in combination with other drugs, is prescribed as an antidote to snake and scorpion venoms (Sushruta).

No part of the plant is an antidote to either snake-venom (Mhaskar and Caius) or scorpion-venom (Caius and Mhaskar).

Bombay: Pangla, Phangla—; *Konkani:* Pangla—; *Marathi:* Pangli—.

COLEBROOKEA Sm.

A densely hoary or woolly shrub. Leaves opposite or ternate, petiolate, rugose, oblong-lanceolate, crenulate. Flowers small; whorls dense-flowered in paniculate spikes; bracteoles connate. Calyx-tube very short; teeth long, subulate, ultimately elongate, capillary and plumose. Corolla small; tube very short; lobes 4, subequal. Stamens 4, very short, included, equal, distant; anthers orbicular, the cells confluent. Disk uniform. Ovary 4-partite; style 2-fid, the lobes subulate. Fruit of 1 or 4 obovoid dry nutlets with hairy tips; basal scar small.—Species 1.—India, China.

1. **Colebrookea oppositifolia** Sm. Exot. Bot. II (1805-07) 111, t. 115.—*C. ternifolia* Roxb. Corom. Pl. III (1819) 40, t. 245.—PLATE 756A.

A functionally diœcious much-branched shrub 1.2-3 m. high; trunk stout, light coloured; branched pale, subquadrangular, usually verticillate in threes, grooved; young shoots downy. Leaves light green, crowded towards the ends of the branches, opposite or verticillate in threes, 10-15 by 2.2-4.5 cm., oblong-lanceolate, acute, crenulate or serrulate, softly pubescent on both sides, base acute; petioles 1-2.5 cm long. Flowers numerous, in paniculate often ternately arranged spikes 5-10 cm. long by 6 mm. diam. in flower, reaching 1.3 cm. diam. or more in fruit; bracts 1.5 mm. long, solitary, linear, pubescent; bracteoles several, 2 mm. long, connate at the base into a whorl. Calyx in flower 2.5-3 mm. long, 5-partite almost to the base; teeth subulate, plumose with white hairs, elongating to nearly 6 mm. in fruit when the spikes appear, like (Indian) squirrels' tails. Corolla 2 mm. long, white; upper lobe

emarginate. Nutlets 0.85 mm. long, oblong-obovoid, pubescent, usually solitary, hairy at the tip.

Distribution: More or less throughout India on low hills.—China.

A preparation from the root is used by the Santals in epilepsy (Campbell).

The leaves are applied to wounds and bruises (Stewart).

The down on the stem and leaves is used by the Paharias of Sikkim to extract worms from bad sores on their legs (Gamble).

Bombay: Bahmani, Bhamini, Dasai, Dasari, Dussarica—; *Canarese:* Tuggigidda—; *Dehra Dun:* Binda—; *Hindi:* Binda, Bindu, Pansra—; *Khond:* Darigopi, Merata—; *Kumaon:* Binda, Bindu, Dulshat—; *Lepcha:* Kumhyemkung—; *Melghat:* Chotabhandara—; *Nepal:* Dosro, Dosul—; *Punjab:* Barmera, Basuti, Briali, Dashane, Duss, Phisbekkar, Sampru, Shakardana, Suali—; *Ramnagar:* Bhuriruoleri—; *Santali:* Barsapakor, Bhainsa—; *Saora:* Jolidi—; *Trans-Indus:* Shakardana—; *Uriya:* Bosiki, Darigopi—.

Mentha Linn.

Strong-scented perennial herbs, rootstock creeping. Whorls many-flowered, in axillary and terminal spikes, bracts various flowers small. Calyx campanulate or tubular, 5-toothed, throat naked or villous. Corolla subequally 4-lobed. Stamens 4, equal, erect, distant; anther-cells parallel. Style-arms short. Nutlets smooth or reticulate.—Species 25.—Old World.

1. Leaves sessile, lanceolate to oblong, coarsely dentate, smooth above, glandular below .... 1. *M. viridis.*
2. Leaves petioled coarsely serrate, smooth above, rarely sparingly hairy on the nerves below .... 2. *M. piperita.*
3. Leaves nearly sessile, sharply toothed, upper surface hoary pubescent, lower white tomentose .... 3. *M. sylvestris.*
4. Leaves narrowed below, stalked, ovate, oblong, lanceolate, toothed .... 4. *M. arvensis.*

Tonic, stomachic, stimulant and carminative, emmenagogue and sudorific, antispasmodic, anthelmintic.

The following species are used medicinally in Europe—*M. aquatica* Linn., *M. arvensis* Linn., *M. cardiaca* J. G. Baker,

In Europe, the herb is considered stimulant, carminative, and antispasmodic. It is added to many compounds on account of its carminative properties and its pleasant taste. For infantile troubles generally the sweetened infusion is an excellent remedy. A distilled water is made which will relieve hiccough and flatulence as well as the giddiness of indigestion.

The oil is less used than that of peppermint.

Bengal: Pudina—; *Bombay:* Pahadipudina, Pudina—; *Catalan:* Herba sana, Menta comuna—; *English:* Brown Mint, Garden Mint. Lamb Mint, Mackerel Mint, Spearmint—; *French:* Baume vert, Menthe â épis, Menthe de Natre-Dame, Menthe romaine, Menthe verte—; *German:* Frauenmuenze, Gruene Muenze, Roemische Minze—; *Gujerati:* Phudino—; *Hindi:* Paharipudina, Pudina—; *Italian:* Menta romana—; *Malta:* Spearmint, Menta comune, Naghnieh— *Marathi:* Pudina—; *North-Western Provinces:* Paharipudina—; *Persian:* Nagbo, Pudneh, Shahsufiam—; *Pishin:* Nana—; *Portuguese:* Hortelao, Ortelao vulgare—; *Punjab:* Paharipodina, Pudina, Pudinakuhi—; *Quetta:* Nana—; *Roumanian:* Izma, Minta—; *Sind:* Phudina—; *Sinhalese:* Meenchi—; *Spanish:* Costo, Menta romana, Yerba buena—; *Telugu:* Pudina—.

2. **Mentha piperita** Linn. Sp. Pl. (1753) 576.—PLATE 757A.

A perennial glabrous strong scented herb. Leaves petioled 2.5-10 cm., acute or obtuse at the base, coarsely serrate, smooth above, rarely sparingly hairy on the nerves below, ovate or oblong-lanceolate, upper smaller, sometimes bracteiform. Whorls in terminal spikes. Spikes cylindric, interrupted below. Bracts minute. Pedicels and flowers glabrous, or very sparingly hispid. Calyx often red.

Perhaps a cross between *M. viridis* Linn. and *M. aquatica* Linn.

Distribution: Cultivated in Indian gardens.

A volatile oil obtained from the plant is well known in medicine for its antiseptic, stimulant, and carminative properties.

In Europe, the herb is considered stimulant, stomachic, carminative; and is used for allaying nausea, flatulence, sickness, vomiting, and as an infants' cordial.

Its bruised fresh leaves, if applied, will relieve local pains and headache. A hot infusion, taken as tea, soothes stomach-ache, allays sickness, and stays colicky diarrhœa. This will also subdue menstrual colic.

Oil of peppermint cannot be recommended as an anthelmintic (Caius and Mhaskar).

Catalan: Menta piperita—; *Chinese:* Po Ho—; *Danish:* Pebermynte—; *Dutch:* Pepermint—; *English:* Brandy Mint, Peppermint—; *French:* Menthe, Menthe anglaise, Menthe d'Angleterre, Menthe officinale, Menthe poivrée—; *German:* Edelmindkraut, Edelminze, Hausminze, Oderminze, Pfefferminze, Pfeffermuenze—; *Hungarian:* Borsos menta—; *Italian:* Menta piperita—; *Norwegian:* Peppermynte—; *Polish:* Pepparmynta—; *Portuguese:* Hortelana pimentosa, Hortelao apimentada, Hortelao pimenta—; *Russian:* Myata perechnaya—; *Spanish:* Menta inglesa, Menta pimentada, Menta piperita, Yerba buena de sabor de pimienta—; *Swedish:* Pepparmynt—.

3. **Mentha sylvestris** Linn. Sp. Pl. ed. 2 (1763) 804.—PLATE 757B.

A strongly scented, erect or diffuse herb; rootstock creeping; stems 0.3-0.9 m., hoary-pubescent. Leaves nearly sessile, lanceolate ovate or oblong, 2.5-7.5 cm., sharply toothed, acute; upper surface hoary-pubescent, lower white-tomentose. Flowers small, lilac, in large whorls crowded in axillary and terminal, cylindric, tapering spikes; lower floral leaves leaf like, upper smaller, lanceolate. Calyx hairy, bell-shaped, acutely 5-toothed. Corolla-tube included in the calyx; limb erect, 4-lobed, lobes nearly equal. Stamens 4, equal, protruding, filaments naked.

Distribution: W. Himalaya, 4,000—12,000 ft.—Temperate Asia, Europe.

The plant is astringent to the bowels, anthelmintic; useful in diseases of the heart, bronchitis, loss of appetite, diarrhœa and dysentery; causes anuria (Ayurveda).

1. *Fudanajhabak type*:—The plant is hot and dry; diuretic, diaphoretic; strengthens the kidney.—The seeds have a bitter, sharp taste; useful in diseases of the blood, chest, liver, spleen; lessen

burning sensations, hiccough, vomiting, flatulence; good for sore eyes, scabies; strengthen the teeth.—2. *Fudanajnaanna type*:—The plant is hot and dry; diuretic, diaphoretic; strengthens the kidney.—The seeds have a bitter, sharp taste; alexiteric, anthelmintic; useful in mental diseases, deafness, throat troubles, leucoderma, vomiting, hiccough, skin eruptions, dropsy, dyspepsia (Yunani).

The leaves soaked in water give an infusion which is drunk as a cooling medicine in Shahrig (Hughes-Buller).

The herb is used as a carminative and stimulant in Europe.

Arabic: Fudanajhabak, Fudanajnaanna—; *Bombay:* Pudina, Vartalau—; *Burma:* Boodeema—; *Catalan:* Menta borda—; *English:* Horse Mint—; *French:* Mentastre, Menthe sauvage—; *Hindi:* Podina—; *Khowas:* Wealni—; *North-Western Provinces:* Padina—; *Punjab:* Baburi, Belanne, Koshu, Pudnakushna, Vien, Yura—; *Pushtu:* Shamshabai—; *Sanskrit:* Ajirnahara, Pudina, Rochani, Ruchishya, Shakashobhana, Sugandhipatra, Vantihara, Vyanjana—; *Shahrig:* Shinshobae, Velanac, Vialangi—; *Spanish:* Mastranzo nevado, Menta silvestre—; *Urdu:* Pudina—; *Zhob:* Shinshobae—.

4. **Mentha arvensis** Linn. Sp. Pl. (1753) 577.—PLATE 758B.

Habit erect. Stem short, branched, with short hairs, dense, and turned back. Leaves narrowed below, stalked, ovate, oblong, lanceolate, toothed, the upper similar and large. Flowers are lilac, in axillary, distant whorls, none at the top. Calyx bell-shaped, with triangular, short teeth, as broad as long. Throat of calyx naked. Corolla lined with hairs and hairy outside. Bracteoles acute, not as long as the flowers. Nutlets dry, smooth.

Distribution: W. Himalaya, Kashmir, 5,000—10,000 ft.—Europe, N. and W. Asia to China.

The plant has a bad taste and smell; expectorant, emmenagogue, tonic to the kidney; useful in diseases of the liver and spleen, asthma, pains in the joints (Yunani).

The dried plant is refrigerant, stomachic, diuretic, and stimulant. It possesses antispasmodic and emmenagogue properties. It is used in jaundice, and is frequently given to stop vomiting.

In China, the leaves and stems are made into infusion, and used as carminative, sudorific, and antispasmodic.

In Annam, the plant is considered an excellent diaphoretic. An infusion is given in fevers, indigestion, and cephalalgia. The juice of the leaves is applied to the sting or bite of poisonous animals. The leaves pounded with salt are applied to the whitlow.

Neither the herb nor pure menthol can be recommended as anthelmintics (Caius and Mhaskar).

Annam: Bac ha, Bac ha tay, Ke to, Kim tien bac ha, Nam ha, Thuy to, To lan—; *Arabic:* Fodanajihindi, Fotanajehindi, Habakjabuli, Habaqulhind, Naanaaehindi, Naanaaulhind—; *Bengal:* Podina—; *Bombay:* Pudinah—; *Burma:* Bhudina—; *Canarese:* Chetnimaragu—; *Chinese:* Po Ho—; *English:* Corn Mint, Marsh Mint—; *French:* Baume des champs, Menthe des champs, Menthe du Japon, Pouliot thym—; *Gujerati:* Pudina—; *Hindi:* Pudinah—; *Languedoc:* Fau pulegi—; *Malaya:* Pok ho—; *Malayalam:* Putiyina—; *Marathi:* Pudina—; *Persian:* Filfilmun, Pudinah—; *Sind:* Pfudnah—; *Sinhalese:* Odutalan—; *Tamil:* Pudina, Yechakkirai—; *Telugu:* Igaenglikura, Pudina—; *Tongking:* Ba Kha—; *Urdu:* Pudinchkohi—.

LYCOPUS Tourn. ex Linn.

Marsh perennial herbs. Leaves toothed or pinnatifid. Flowers small in dense axillary whorls. Calyx subequally 4-5-toothed, throat naked. Corolla campanulate, subequally 4-5-fid. Stamens 2, distant; anther-cells parallel; staminodes 2. Style 2-fid, lobes flattened. Nutlets smooth, obovate, compressed, margins thickened.—Species 10.—N. temperate.

L. europoeus is used medicinally in the United States of America.

1. **Lycopus europaeus** Linn. Sp. Pl. (1753) 21.—PLATE 758A.

An erect, nearly glabrous herb, 0.3-0.9 m.; rootstock creeping. Leaves nearly sessile, lanceolate, 5-10 cm., deeply and sharply toothed. Flowers small, white, dotted with purple, crowded in sessile, axillary

whorls. Calyx bell-shaped, deeply 5-toothed; teeth equal, narrowly lanceolate, acute. Corolla bell-shaped, slightly longer than the calyx, 4-lobed. Stamens 2, slightly protruding.

Distribution: W. Himalaya, Kashmir, 1,000—6,000 ft., Punjab Plains, up to 7,000 ft. —Temperate Asia, Europe.

The leaves are used externally as a poultice to cleanse foul wounds.

It is used in the Punjab, as a cooling drug (Stewart).

In the United States of America, the plant is considered a mild narcotic and an astringent, useful in pulmonic and other hæmorrhages.

English: Gipsywort—; *French:* Marube aquatique—; *German:* Wolfsfuss—; *Kashmir:* Gandamgundu, Jalnim—.

ORIGANUM Tourn. ex Linn.

Aromatic herbs or undershrubs. Leaves entire or toothed. Cymes corymbose, bracts large, imbricating. Calyx 10-13-nerved, 5-toothed or 2-lipped; throat villous. Corolla obscurely 2-lipped, upper lip notched or 2-fid; lower spreading, 3-fid. Stamens 4, distant, ascending; anther-cells distinct, spreading. Style-lobes acute. Nutlets smooth.—Species 7.—Europe, Mediterranean.

1. The 2 longest stamens and sometimes all 4 projecting beyond the corolla .... 1. *O. majorana.*
2. Stamens 4 in unequal pairs slightly protruding .... 2. *O. vulgare.*

Stimulant and carminative, vulnerary and febrifuge.

O. dictamnus Linn., *O. hirtum* Link., *O. majorana* Linn., *O. virens* Hoff. and Link, *O. vulgare* Linn. are used medicinally in Europe; *O. vulgare* Linn. is also used in China and Malaya.

OFFICIAL :—The flowered herb of *O. creticum* Linn. and *O. creticum* Linn. var. *macrostachyum* Brot.=*O. macrostachyum* Hoffmseg. and Link (Portugal), *O. dictamnus* Linn. (France), *O. majorana* Linn. (France, Holland, Italy), *O. vulgare* Linn. (Austria, Denmark, France, Norway),—var. *virens* Brot. non Decand.=*O. virens* Hoffmseg. and Link (Portugal).

1. **Origanum majorana** Linn. Sp. Pl. (1753) 590.—PLATE 759B.

Rootstock perennial, shortly creeping; the annual stems erect, 30-60 cm. high, more or less hairy. Leaves stalked, ovate or ovate-lanceolate, 3.5 or more long, and slightly toothed. Flowers purple or rarely white, in globular compact heads, forming a terminal trichotomous panicle. Bracts ovate, about the length of the calyx. Calyx very hairy inside the mouth, with short, nearly equal teeth. Corolla twice as long as the calyx, with 4 broad, nearly equal lobes, of which the upper one is broader and nearly erect. The two longest stamens, and sometimes all four, project beyond the corolla.

Distribution: A native of S. Europe, N. Africa, and Asia Minor; extensively cultivated in India.

The plant is pungent, bitter, hot; stomachic, anthelmintic, alexipharmic; improves appetite; useful in diseases of the heart and blood, "kapha" and "vata", fevers, leucoderma, pruritus, bad taste, asthma, inflammations, constipation, flatulence, pain; causes biliousness (Ayurveda).

The plant is carminative, expectorant, tonic to the liver; lessens inflammation, alcoholic intoxication; brings back consciousness; good for the brain and the intestines; useful in vomiting and in pain (Yunani).

The leaves and seeds are considered astringent and a remedy for colic. The essential oil from the leaves is used for hot fomentations in acute diarrhœa.

In Europe, an infusion made from the fresh plant is given to relieve nervous headaches; and externally the herb is applied in bags as a hot fomentation to painful swellings and rheumatism, as likewise for colic. The volatile oil is considered an excellent external application for sprains, bruises, etc.

Arabic: Mardakusch, Mizunjush—; *Bengal:* Murru—; *Catalan:* Moraduix, Moradux—; *Deccan:* Murwa—; *Dutch:* Marjolein—; *English:* Sweet-knotted Marjoram, Sweet Marjoram—; *French:* Marjolaine à coquille, Marjolaine des jardins, Marjolaine d'Orient, Origan marjolaine—; *German:* Badkraut, Blaudoste, Blauer Tarant,

Blaudunst, Costenzkraut, Doschte, Dost, Felddoste, Frauendosten, Kostenskraut, Kunerle, Kuttelkraut, Majoran, Maraun, Margrankraut, Marieleine, Masaran, Maseran, Masoran, Meiran, Meyrah, Muellerkraut, Ohrkraut, Schusterkraut, Sommermajoram, Thorant, Walddosten, Wohlgemut, Wurstkraut—; *Greek:* Amarakon—; *Hindi:* Murwa—; *Italian:* Maggiorana, Marjorana, Persa—; *Kumaon:* Bantulsi—; *Languedoc:* Majourana, Majourena, Majurena, Mayran—; *Malta:* Sweet Marjoram, Maggiorana, Persia, Mertkux—; *Roumanian:* Maghiran—; *Russian:* Mayoran—; *Sanskrit:* Ajanmasurabhipatra, Bahuvirya, Gandhapatra, Jambira, Kharapatra, Kulasaurabha, Maricha, Maru, Marubaka, Maruta, Marataka, Phani, Phanijjaka, Prasthakusuma, Prasthapushpa, Samirana, Shitalaka, Suravha—; *Sind:* Murwo—; *Spanish:* Almoradux, Mejorana—; *Tamil:* Marru—; *Urdu:* Marvakhusha—.

2. **Origanum Vulgare** Linn. Sp. Pl. (1753) 590.—PLATE 759A.

An erect herb, 0.3-0.9 m., more or less clothed with short hairs. Leaves stalked, ovate, about 2.5 by 2 cm., entire. Flowers small, pink, crowded in numerous, 4-sided spikes 6-25 mm. long in clusters or heads at the ends of the branches, sometimes forming terminal panicles; floral leaves bract-like, lanceolate, longer than the calyx, overlapping, often tinged with purple. Calyx bell-shaped, enlarged in fruit, 5-toothed, mouth hairy within. Corolla-tube longer than the calyx; limb 2-lipped, upper lip erect, nearly flat, notched, lower spreading, 3-lobed. Stamens 4 in unequal pairs, slightly protruding.

Distribution: Temperate Himalaya, from Kashmir to Sikkim, 7,000—12,000 ft.—Europe, N. Africa, W. and N. Asia.

The plant has a bad smell and a bitter taste; useful in inflammations, catarrh, headache, paralysis.—The leaves are good for earache, bronchitis, asthma; enrich the blood.—The flowers are applied in hemicrania, the oil in rheumatism (Yunani).

The whole herb is medicinal and contains a volatile oil, which is separated by distillation. Perspiration may be produced by a warm infusion, and this is also taken to promote the menstrual flow,

when suppressed by cold. The oil is stimulant and rubefacient, and often used as a liniment; it is given as a stimulant and tonic in colic, diarrhœa, and hysteria. It is also applied in chronic rheumatism, tooth-ache, and earache.

In China, the herb is considered an excellent refrigerant.

Arabic: Buklutulgezal, Mirzanjosha, Sutur—; *Bohemian:* Dobramyssl—; *Catalan:* Orenga—; *Chinese:* Ching Chieh, Yin Ch'en—; *Danish:* Tost, Vild merian—; *Dutch:* Orego—; *English:* Argans, Common Marjoram, English Marjoram, Marjoram, Orgament, Organ, Organy, Origany, Pot Marjoram, Wild Marjoram—; *French:* Grande marjolaine, Grande marjolaine bâtarde, Grande marjolaine sauvage, Grand origan, Marjolaine d'Angleterre, Marjolaine bâtarde, Marjolaine sauvage, Pied de lit, Origan, Origan commun, Origan vulgaire—; *German:* Blauer Orant, Brauner Dosten, Dosten, Wilder Majoran—; *Greek:* Origanos—; *Hindi:* Mirzanjosh, Sathra—; *Italian:* Origano, Regamo—; *Malaya:* Yan chan—; *Malta:* Common Marjoram, Pot Marjoram, Regamo, Acciughero, Riegnu—; *Norwegian:* Vild merican—; *Persian:* Mizangosch, Mirzanjosha, Oushneh—; *Polish:* Lebiotka—; *Portuguese:* Ouregao, Ouregos—; *Punjab:* Mirzanjosh—; *Russian:* Dushitsa—; *Spanish:* Oregano—; *Swedish:* Dosta—; *Telugu:* Mridumaruvamu—; *Urdu:* Mirzanjosha—.

THYMUS Tourn. ex Linn.

Small, slender, much-branched shrubs, very aromatic. Leaves small, quite entire. Cymes few-flowered, in dense or lax spikes, bracts minute; flowers small. Calyx 10-13-nerved, 2-lipped; throat villous. Corolla obscurely 2-lipped; upper lip straight, flattish, notched, lower 3-fid. Stamens 4, distant, straight, lower pair longer; anther-cells parallel or diverging. Style-lobes subulate. Nutlets nearly smooth.—Species 33.—Temperate regions.

Stimulant, carminative, anthelmintic, antiseptic.

T. mastichina Linn., *T. serpyllum* Linn., and *T. vulgaris* Linn. are used medicinally in Europe.

OFFICIAL :—The flowered stem of *T. Serpyllum* (France, Germany, Russia, Sweden, Switzerland, Turkey),—Brot. non Linn.

=*T. glabratus* Hoffmseg. and Link. (Portugal), *T. vulgaris* Linn. (Belgium, Denmark, France, Germany, Great Britain, Holland, Italy, Japan, Norway, Portugal, Sweden, Switzerland), *T. Zygis* Linn. var. *sylvestris* Brot.=*T. sylvestris* Hoffmseg. and Link and var. *variabilis* Brot.=*T.variabilis* Hoffmseg. and Link (Portugal).

The oil from *T. Serpyllum* Linn. (Belgium), *T. vulgaris* Linn. (Germany, Japan, Russia, Spain, Switzerland, Turkey).

1. **Thymus serpyllum** Linn. Sp. Pl. (1753) 590.—PLATE 760B.

An aromatic, hairy, more or less procumbent, often tufted shrub, usually about 15-30 cm. Leaves nearly sessile, gland-dotted, oblong-ovate, about 8 mm., entire, obtuse. Flowers small, purple, sometimes 1-sexual, in small whorls crowded in short, terminal spikes. Calyx hairy, gland-dotted, 2-lipped, mouth hairy within; upper lip broad, 3-toothed, lower 2-parted, segments linear. Corolla-tube as long as the calyx; limb 2-lipped, upper lip nearly erect, flat, notched, lower spreading, 3-lobed. Stamens 4, nearly equal, protruding.

Distribution: W. temperate Himalaya, from Kashmir to Kumaon, 5,000—13,000 ft. —Europe, N. Africa, W. and N. Asia.

The plant has a sharp, pleasant taste; emmenagogue, alexiteric, anthelmintic; good in liver complaints, pain in the liver, spleen, chest; useful in asthma, bronchitis; thins phlegm and blood.—The leaves are laxative, stomachic, tonic; good for the kidney and the eye; useful in bronchitis and eye troubles; purify the blood (Yunani).

In the Punjab, the herb is given in weak vision, complaints of the stomach and the liver, suppression of urine and menstruation (Honigberger). On the Chenab, the seeds are given as a vermifuge (Stewart).

The oil is sometimes applied as a remedy in tooth-ache.

In Europe, the herb is considered antispasmodic, carminative, and tonic. An infusion is given in convulsive coughs, whooping coughs, catarrh, and sore throat; it is good for nervous or hysterical headaches, for flatulence, and the headache which follows inebriation. The infusion is also profitably applied for healing skin eruptions of various characters.

A study of the essential oil from plants grown in Punjab and Kashmir was undertaken by Jagjit Singh and B. Sanjiva Rao (*Journ. Ind. Inst. Sc.;* XV, 1933).

Catalan: Farigola de montanya, Serpoll—; *Danish:* Vildtimian—; *Dutch:* Quendel, Wilde Thym—; *English:* Bank Thyme, Brotherwort, Creeping Thyme, Hill-wort, Horse Thyme, Mother of Thyme, Pella Mountain, Penny Mountain, Piliol, Puliall Mountain, Running Thyme, Serpell, Shepherd's Wild Thyme, Thyme, Wild English Thyme, Wild Thyme—; *French:* Mignotise des Génevoix, Pillolet, Piolet, Poleur, Pote, Pouilleux, Pouliet, Pouliot bâtard, Serpolet, Serpoule, Thym bâtard, Thym rouge, Thym sauvage, Thym serpolet—; *German:* Ameisenkraut, Bienenkraut, Choelm, Citronenquendel, Demutkraut, Fallboll, Feldkoehm, Feldkuemmel, Feldquendel, Feldthymian, Gundelkraut, Gundling, Gunnerle, Heidequendel, Heublume, Huehnerklee, Huehnerkull, Immenkraut, Jungfernzucht, Kandelkraut, Karwendel, Kindelkraut, Kingle, Koschmes, Kostenskraut, Kudelkraut, Kuechenpolei, Kuekenkuemmel, Kuenlein, Kulkraut, Kundelkraut, Kunerle, Kutelkraut, Magaro, Marienbettstroh, Mattenkolen, Neugelenk, Quandel, Quangelchen, Quendel, Quengel, Raenderpolei, Rainkuemmel, Rainpolei, Schmergel, Simio, Steinquendel, Thymchen, Thyrmann, Tuemchen, Unsererliebenfrauenbettstroh, Zymis—; *Greek:* Erpylos—; *Hindi:* Banajwain—; *Italian:* Pepolino, Sermollino, Serpillo, Serpolino, Serpollo—; *Languedoc:* Faligouleto, Ferigouleto—; *North-Western Provinces:* Banajwain—; *Polish:* Mauerzanka—; *Portuguese:* Serpao, Serpil, Serpilhi, Serpol—; *Punjab:* Kalandarzatar, Marizha, Masho, Rangsbur, Shakei—; *Roumanian:* Cimbru de camp, Cimbrusor, Serpun, Serpunel—; *Russian:* Bogorodskaya trava, Chaber, Chabietz—; *Spanish:* Serpol—; *Swedish:* Backtimjan, Bracktimian—; *Turkish:* Sateriberri—; *Urdu:* Hasha—.

HYSSOPUS (Tourn.) Linn.

An undershrub. Leaves sessile, obtuse, entire. Whorls 6-15-flowered, secund, axillary and in terminal spikes. Calyx 15-nerved, 5-toothed, throat naked. Corolla 2-lipped; upper lip erect, flat,

notched; lower spreading, 3-lobed, midlobe very broad. Stamens 4, exserted, diverging, lower longer; anther-cells linear, spreading. Style-lobes subequal, subulate. Nutlets narrow, nearly smooth, triquetrous.—Species 1.—Europe, Mediterranean, Asia.

H. officinalis Linn. is used medicinally in Europe. The herb is official in France, Portugal, and Sweden.

1. **Hyssopus officinalis** Linn. Sp. Pl. (1753) 569.—PLATE 760A.

An undershrub, usually glabrous. Stem branched below, branches woody 30-60 cm., erect or diffuse. Leaves sessile, oblong linear or lanceolate, entire, obtuse. Whorls 6-15-flowered, secund, axillary and in terminal spikes. Fruiting calyx, 6-8 mm. long. Corolla bluish purple. Nutlets narrow, nearly smooth, triquetrous.

Distribution: W. Himalaya, from Kashmir to Kumaon, 8,000—11,000 ft.—W. Asia. E. Europe.

1. *Zufah-e-Yabis* :—The plant is bitter; anthelmintic, expectorant, carminative, alexipharmic, laxative; useful in inflammations, paralysis, chronic bronchitis, inflammation of the lungs, asthma, pain in the muscles, the chest and the liver; gargles are good for strengthening the teeth.—2. *Zufah-ul-ratih* :—The plant has a bad taste and smell; emmenagogue, diuretic; useful in inflammations, griping pain, thirst, scabies, earache (Yunani).

The plant is stimulant, carminative, and pectoral. This forms an agreeable remedy in cases of colds, coughs, consumption, and lung complaints.

It is used for coughs and asthma in infusion; also in tooth-ache, uterine or vesical affections, and indurations of the liver or spleen. The leaves are said to be stimulant, stomachic, emmenagogue and carminative; useful in hysteria and colic. Also used as a poultice to bruises, especially of the eyes. The sap of the leaves made into a syrup with sugar and honey is used as a vermifuge for round-worms.

A decoction of the flowers of this plant from Persia was given in cases of asthma and chronic bronchitis and found to be a useful remedy in those complaints (Koman).

Arabic: Zufaheyabis, Zufahulretih—; *Catalan:* Hisop—; *Danish:* Isop—; *Dutch:* Hysop—; *English:* Hyssop—; *French:* Herbe sacrée, Hysope—; *German:* Apothekerhysop, Eiserich, Gartenrispe, Hyssop, Isipo, Isop, Ispern, Isæl, Josephskraut, Klosteruesopp, Lufftskraut, Ysop—; *Greek:* Hyssopos—; *Hindi:* Zufahyabis—; *Italian:* Isopo, Issopo—; *Languedoc:* Mariarmo—; *Persian:* Zufahekhuskka, Zufahetar, Zufaheyabis—; *Polish:* Isopek—; *Portuguese:* Hissopo—; *Roumanian:* Cimbru cel brun, Isop—; *Russian:* Issop—; *Spanish:* Hisopo—; *Swedish:* Isop—; *Urdu:* Zufah—.

MICROMERIA Benth.

Herbs or undershrubs. Leaves usually small, entire or toothed. Flowers small; whorls few- or many- flowered in axillary or terminal spikes (rarely paniculate). Calyx 13-nerved, 5-toothed or 2-lipped. Corolla 2-lipped; tube straight; upper lip entire or notched, flattish; lower lip spreading, 3-fid. Stamens 4, didynamous, the lower pair longer, ascending, incurved with diverging tips; anther-cells distinct, parallel, at length divergent; connective usually thickened. Ovary 4-lobed; style 2-lobed, the lobes equal or the upper very short, the lower recurved, flattened. Fruit of 4 smooth dry ovoid or oblong nutlets; basal scar small.—Species 130.—Cosmopolitan.

M. douglasii Benth. is used popularly as an emmenagogue along the Pacific Coast.

1. **Micromeria capitellata** Benth. in DC. Prodr. XII (1848) 218.—PLATE 761C.

A highly aromatic herb 30-60 cm. high with woody rootstock; stems slender, erect, quadrangular, pubescent, sometimes tinged with purple. Leaves 1.3-2.5 by 0.6-1.6 cm., ovate, subobtuse, pubescent on both sides, gland-dotted, crenate or entire, ciliate; petioles 4-5 mm. long. Flowers in verticillate distant cymes in the axils of floral leaves which become smaller upwards, the lower cymes pedunculate, the upper sessile, the whole forming a long spicate raceme; bracts small, linear-lanceolate, pubescent. Calyx in flower 2.5 mm. long, hairy and glandular; teeth 0.85 mm. long, lanceolate-subulate, erect, ciliate. Corolla 3 mm. long, pubescent outside, 2-lipped; upper lip

pale violet almost white, about 0.85 mm. long, oblong, subtruncate, slightly notched; lower lip darker violet, twice as long as the upper, 3-lobed, the lobes spreading, the middle one the largest. Nutlets 0.85 mm. long, ellipsoid, the inner face slightly angular, the dorsal face rounded, smooth, brown.

Distribution: Upper Gangetic Plain, Chota Nagpur, Bihar, W. Ghats, N. Circars, Nilgiris.

It is a fairly good substitute for *Mentha piperita.*

Calamintha (Tourn.) Lam.

Herbs or shrubs. Leaves entire or toothed. Flowers small, whorls dense and axillary or loose and panicled or in spikes. Calyx 13-nerved, 2-lipped, upper lip 3-toothed, lower 2-fid, and with narrower teeth, throat naked or villous. Corolla 2-lipped, tube straight, throat villous; upper lip erect, flattish; lower spreading, 3-lobed. Stamens didynamous (the upper pair rarely imperfect); lower pair longer, ascending under the upper lip; anther-cells distinct, parallel or diverging. Ovary 4-lobed; style 2-fid, the lobes equal, or the lower larger. Nutlets 4, minute, subglobose, dry, smooth.—Species 60.—Temperate regions, tropical mountains.

Stimulant, tonic, and astringent.

C. acinos DC., *C. alpina* Lamb., *C. grandiflora* Mœnch,, *C. clinopodium* Benth., *C. nepeta* Savi., *C. officinalis* Mœnch., *C. vulgaris* Krst. are used medicinally in Europe.

The flowered plant of *C. officinalis* Mœnch. is official in France.

1. **Calamintha clinopodium** Benth. in DC. Prodr. XII (1848) 233.—Plate 761D.

Stems erect. Leaves ovate, 2.5-4.5 cm., entire or toothed. Flowers in large, crowded, compact whorls each surrounded by an involucre of numerous, long, linear, hairy bracts. Calyx 8 mm. long.

Distribution: W. temperate Himalaya, from Kashmir to Kumaon, 4,000—12,000 ft. —Europe, N. Africa, N. and W. Asia, Canada.

The plant is cephalic, astringent, carminative, and tonic to the heart.

Arabic: Asaba-el-fatiyat—; *Spanish:* Albahaca silvestre major—.

MELISSA Tourn. ex Linn.

Erect branched herbs. Leaves opposite, crenate. Whorls axillary, secund, lax-flowered. Calyx 13-ribbed; lips small; upper flattish, 3-toothed; lower 2-toothed. Corolla-tube recurved and ascending; upper lip erect; lower flat, spreading, 3-lobed. Stamens 4, arching and meeting under the upper lip; anther-cells at length divaricate. Style-lobes subequal, subulate. Nutlets narrowly obovoid, smooth, dark.—Species 4.—Europe, W. Asia.

The genus is carminative and stomachic.

M. officinalis Linn. is used medicinally in Europe. Its leaves are official in Austria, Belgium, Denmark, France, Germany, Hungary, Italy, Norway, Spain, Switzerland, and Turkey.

M. officinalis Linn. (*M. graveolens* Host.) is official in Portugal.

1. **Melissa parviflora** Benth. Lab. 394.—PLATE 761B.

A pubescent or glabrate herb. Stem tall erect, angles hirsute. Leaves 2.5-10 cm., ovate or ovate-lanceolate acute, base acute, rotund or cordate; petiole 6-25 mm., slender. Whorls numerous, few- or many- flowered; flowers pedicelled. Calyx 6-8 mm., teeth very variable in length of the acute points; bracts narrow. Corolla white, tube very short, scarcely exceeding the calyx.

Distribution: Temperate Himalaya, from Garhwal to Sikkim and Mishmi, Khasia Hills.—Java.

The leaves and stem are slightly bitter; antipyretic; useful in diseases of the heart, brain, liver; good for insanity, giddiness, hiccough, bronchitis, griping, muscular pain, asthma, hydrophobia, tuberculous glands, headache, scabies.—The fruit is a brain tonic and useful in hypochondriac conditions.—The plant strengthens the gums and removes bad taste from the mouth (Yunani).

A good substitute for *M. officinalis*.

Arabic: Baklatelutrujiya, Mufarehulkalab—; *Hindi:* Bililotan—; *Persian:* Badrunjboya—; *Urdu:* Baranjboya—.

PEROVSKIA Karel.

Erect branched, strong-scented, rigid, hoary and scurfy, dioecious undershrubs. Leaves opposite, incised or crenate. Whorls small, distant, in simple or compound or panicled spikes, 2- or more-flowered; flowers small. Calyx short, terete; lips short, upper minutely 2-3-toothed, lower 2-toothed. Corolla 2-lipped, tube exserted, with a ring of hairs within, lower lip oblong entire, upper broad spreading erect 3-lobed. Stamens, 2 lower fertile, erect, diverging; 2 upper minute, imperfect; anther-cells linear, parallel. Disk swollen behind. Style-lobes acute. Nutlets pyriform, smooth, dry.—Species 4.—Central Asiatic.

1. Leaves linear-oblong, incised or pinnatisect. Calyx closed with long cottony wool .... 1. *P. abrotanoides.*
2. Leaves oblong-ovate or lanceolate, crenate-serrate or incised. Calyx hispid .... 2. *P. atriplicifolia.*

The genus exhibits cooling properties.

1. **Perovskia abrotanoides** Karel. in Bull. Mosq. (1841) 15, t. 1.—PLATE 761A.

An erect much-branched, dioecious strong scented twiggy shrub or undershrub 0.6-1.2 m., woody below, densely or sparsely clothed with white or grey stellate scurf. Leaves opposite, linear-oblong, incised or pinnatisect, sometimes bipinnatisect; crenatures or lobes or segments obtuse. Flowers small, whorls small, distant, in simple or compound or panicled spikes, 2- or more- flowered. Calyx clothed with long cottony wool. Stamens 2, lower fertile. Nutlets pyriform, smooth, dry.

Distribution: W. Himalaya, 8,000—13,000 ft., Baluchistan.—Afghanistan, Persia, Turcomania.

At Ziarat the plant is used as a cooling medicine (Lace).
Pushtu: Shanshohai—.

2. **Perovskia atriplicifolia** Benth. in DC. Prodr. XII (1848) 261.

A rigid herb, 0.6-0.9 m. high, paniculately branched, densely clothed with white stellate scurf. Leaves oblong, ovate or lanceolate,

crenate-serrate or incised, 2.5-5 cm. long, rugose. Whorls 2-6-flowered. Calyx 4 mm., hispid. Corolla twice as long.

Perhaps only a form of the previous species.

Distribution: Kashmir, 7,500—10,000 ft., Baluchistan.—Afghanistan.

In Baluchistan, the plant is used as a cooling medicine (Hughes-Buller).

The essential oil from the flower heads was studied by Madyar Gopal Rao (*Journ. Ind. Chem. Soc.; III*, 1926).

Baluchistan: Gwareedumoo, Tirk—; *Harboi Hills:* Gwaridrane—.

MERIANDRA Benth.

Shrubs smelling of sage, hoary or woolly. Leaves opposite, coriaceous, oblong, crenulate, rugulose above. Whorls many, dense-flowered, large and in terminal broad spikes or small and in panicled calkin-like spikes with closely imbricating bracts; flowers small. Calyx ovoid, upper lip concave, subentire; lower 2-fid; throat naked. Corolla-tube short, equally 4-fid; lobes flat, upper entire or 2-fid. Stamens short, stout; 2 lower fertile erect distant, one or both of upper imperfect; anther-cells separate, stipitate, pendulous. Style 2-lamellate. Nutlets obovoid, smooth, brown.—Species 2.—Himalaya, Abyssinia.

1. Flocculently woolly .... 1. *M. strobilifera.*
2. Finely tomentose or hoary .... 2. *M. bengalensis.*

Aromatic, tonic, stomachic, astringent.

1. **Meriandra strobilifera** Benth. Lab. 188.— PLATE 762B.

An erect, tomentose shrub, 0.6-1.5 m. Leaves thick, shortly stalked, oblong or lanceolate, 5-10 by 2-3.8 cm., crenate, base prolonged downwards in 2 pointed lobes; upper surface pubescent, closely wrinkled; lower white-tomentose. Flowers small, white, in large whorls crowded in erect, tomentose, 4-sided, often paniculate spikes; floral leaves small, bract-like, sessile, ovate, overlapping. Calyx tubular-ovoid, 2-lipped; upper lip concave, entire, lower

2-toothed. Corolla-tube as long as the calyx; limb spreading, 4-lobed. Stamens 2, anthers protruding.

Distribution: W. temperate Himalaya, from Simla to Kumaon, 5,000—6,000 ft.

The decoction, when made strong, is a good lotion for ulcers and heals raw abrasions of the skin. It dries up the breast milk.

2. **Meriandra bengalensis** Benth. Lab. 189.—PLATE 762A.

A shrub with smell of sage with tomentose shoots and lanceolate-oblong leaves, larger 12.5 by 4.3 cm., smaller upwards, appearing almost punctate beneath from the close raised tomentose reticulation, subobtuse. Bracts inconspicuous in fruit and shorter than the whorl. Whorls 7.5 mm. diam. in flower, 2 cm. in fruit, close dense in terminal spikes 5-12.5 cm. long. Flowers white.

Distribution: A native of Abyssinia.—Cultivated in India.

An infusion of the leaves is a useful application to aphthæ and sore throats. It diminishes or arrests the secretion of milk.

Bombay: Kafurkapatta, Sesti—; *Deccan:* Kafurkapatta—; *English:* Bengal Sage—; *Hindi:* Kafurkapat—; *Tamil:* Sayayilai—; *Telugu:* Simakarpuramu—.

SALVIA Linn.

Herbs, undershrubs, or shrubs of various habit. Flowers small, or large and showy; whorls usually racemose or spicate; bracts small or large, sometimes coloured. Calyx tubular or campanulate, 2-lipped; throat naked; upper lip entire or 3-toothed; lower lip 2-fid. Corolla 2-lipped; tube naked or annulate within; upper lip erect; lower 3-lobed, the middle lobe usually broader, entire or emarginate. Perfect stamens 2 (the lower); filaments short, articulate with a slender connective, sometimes produced beyond the joint; connective linear, transverse, the upper arm ascending and bearing a linear fertile cell, the lower arm straight or deflexed, bearing a fertile or empty cell or naked; upper stamens represented by 2 small staminodes or obsolete. Disk usually enlarged in front. Ovary

4-partite; style shortly 2-fid, the lobes subulate, equal or the lower longer, sometimes flattened. Fruit of 4 ovoid somewhat triquetrous smooth nutlets; basal scar small.—Species 550.—Tropical and temperate.

A. Perennial herbs with large orbicular cuspidate floral leaves. Upper calyx-lip 3-toothed. Corolla-tube exserted
 1. Leaves long-petioled .... 1. *S. moorcroftiana.*
 2. Leaves sessile .... 2. *S. lanata.*
B. Herbs or shrubs with minute floral leaves. Calyx with the upper lip entire or shortly 3-toothed, lower bifid
 1. Annual .... 3. *S. plebeia.*
 2. A dwarf scaberulous hispid or hoary much-branched undershrub .... 4. *S. aegytiaca.*
 3. Shrubby, much-branched, softly villous-canescent .... 5. *S. cabulica.*
 4. Stem erect, forming a large pyramidal panicle .... 6. *S. spinosa.*
 5. Hardy white woolly undershrub. Corolla purple, blue or white .... 7. *S. officinalis.*

Aromatic, tonic, stomachic, astringent.

The following species are used medicinally in Europe—*S. æthiopis* Linn., *S. canariensis* Linn., *S. glutinosa* Linn., *S. grahami* Benth., *S. hispanica* Linn., *S. horminum* Linn., *S. officinalis* Linn., *S. pratensis* Linn., *S. sclarea* Linn., *S. triloba* Linn. fil., *S. verbenaca* Linn., *S. verticillata* Linn., *S. viridis* Linn.—; in China—*S. japonica* Thunb., *S. miltiorhiza* Bunge., *S. plebeja* R. Br.—; in Malaya—*S. miltiorhiza* Bunge—; in North America— *S. lanceolata* Bruce, *S. officinalis* Linn., *S. verbenaca* Linn.—; in Mexico— *S. polystachya* Ort., *S. hispanica* Linn.—; in Madagascar— *S. leucodermis* Bak.—; in La Reunion— *S. gerardiana* Benth.—; in South Africa—*S. africana* Linn., *S. aurea* Linn., *S. coccinea* Juss., *S. paniculata* Linn., *S. repens* Burch., *S. rugosa* Thunb., *S. runcinata* Linn. fil., *S. scabra* Thunb., *S. sisymbrifolia* Skan., *S. stenophylla* Burch., *S. triangularis* Thunb.—.

OFFICIAL :—The leaves of *S. officinalis* Linn. in Austria, Denmark, France, Germany, Holland, Hungary, Italy, Japan, Norway, Russia, Switzerland, and Turkey; *S. officinalis* Linn. (*S. grandiflora* Ten. non Ettling) in Portugal.

1. **Salvia moorcroftiana** Wall. Cat. 2144.—PLATE 763B.

Clothed with white, usually woolly or cottony hairs; stems 0.45-0.9 m. Leaves thick, long-stalked, ovate or oblong, 12.5-20 by 6.3-15 cm., sinuately and irregularly lobed, crenate or sharply toothed; upper surface nearly glabrous or cottony-tomentose, closely wrinkled; lower white-tomentose. Flowers 2.5 cm. long, pale blue, lilac or nearly white, in distant whorls; bracts large, pale, green-veined, orbicular, abruptly pointed. Calyx bristly, bell-shaped; teeth spinous; upper lip 3-toothed. Corolla-tube much longer than the calyx; upper lip long, curved, flattened, concave.

Distribution: W. Himalaya, from Kashmir to Kumaon, 6,000—9,000 ft.

The root is given in cough, and the seeds are used as an emetic. The leaves are a medicine for guinea-worm and itch, and in the form of poultice applied to wounds. At Lahore, the seeds are given in colic and dysentery, and are applied to boils. The seeds are given for hæmorrhoids.

Punjab: Gurgumma, Halu, Kallijarri, Laphra, Papra, Shobri, Thut—.

2. **Salvia lanata** Roxb. Fl. Ind. I (1832) 147.—PLATE 763A.

White woolly-tomentose; stems 30-45 cm. Leaves mostly radical, sessile, oblong-lanceolate, 7.5-15 by 2-3.8 cm., toothed; upper surface tomentose or nearly glabrous, closely wrinkled; lower tomentose. Flowers 2 cm. long, blue-grey, in distant whorls; bracts viscidly hairy, large, orbicular, abruptly pointed. Calyx viscidly hairy, bell-shaped; teeth spinous; upper lip 3-toothed. Corolla-tube not longer than the calyx; upper lip long, curved, flattened, concave.

Distribution: W. Himalaya, from Murree to Kumaon, 5,000—8,000 ft.

A good substitute for *S. moorcroftiana.*

3. **Salvia plebeia** R. Br. Prodr. (1810) 501.—PLATE 764A.

An erect herb 15-50 cm. high; stems hoary-pubescent, obtusely quadrangular, grooved. Leaves 5-10 by 2-4.5 cm., oblong-lanceolate, obtuse or subacute, irregularly crenate, sparsely hairy or nearly glabrous, base usually acute, often decurrent into the petiole;

petioles 2.5-5 cm. long. Flowers in paniculate (often somewhat compactly arranged) interrupted pubescent spicate racemes; floral leaves 2.5 mm. long, broadly ovate, subacute, shortly petiolate; bracts small, linear-spathulate. Calyx pedicellate, hairy, 2.5-3 mm. long in flower, 4-5 mm. long in fruit, 2-lipped; upper lip obtuse, entire, shorter than the lower, reflexed; lower lip 2-fid, the lobes triangular, acute or subacute. Corolla 4 mm. long; tube 3 mm. long; upper lip oblong, obtuse; lower lip 3-lobed, the middle lobe much larger than the short obtuse lateral ones. Nutlets 1 mm. long, ovoid, the inner face slightly angular, the dorsal face rounded, smooth, brown.

Distribution: Throughout India.—China, Malay Islands, Australia.

The seeds are used in gonorrhœa and menorrhagia (Stewart).

Bengal: Bhutulsi, Kokaburadi—; *Bombay:* Kammarkas—; *Chinese:* Ching Chieh—; *Punjab:* Samundarsok, Sathi—; *Sind:* Kiuro—.

4. **Salvia aegyptiaca** Linn. Sp. Pl. (1753) 23.—PLATE 764B.

A low much-branched straggling undershrub; branches divaricate, rigid, hairy, quadrangular. Leaves variable, 6-38 by 2.5-8 mm., subsessile or shortly petiolate, linear-lanceolate, acute, rigid, crenate, much wrinkled, hairy; nerves and veins prominent. Flowers in long racemes; whorls 2-4-flowered, distant; floral leaves small, ovate-lanceolate. Calyx in flower 3-4 mm. long., glandular-hairy, in fruit twice as long, nodding, pedicellate; upper lip with 3 short connivent acute teeth; lower lip with 2 lanceolate acute lobes. Corolla 5 mm. long; tube annulate within; upper lip oblong, subquadrate, notched; lower lip 3-lobed, the middle lobe emarginate, larger than the obtuse lateral ones. Nutlets 2 mm. long, oblong-ellipsoid, the inner face very slightly angular, the dorsal face rounded, bluish black, smooth.

Distribution: Punjab Plains, Sind, Baluchistan.—Afghanistan, W. Asia, N. Africa to the Cape Verde Islands.

The seeds are used in diarrhœa, gonorrhœa, and hæmorrhoids (Stewart).

At Pab in Jhalawan, the plant is used as a cure for eye diseases (Hughes-Buller).

Bolan: Chamimar, Chammamaor—; *Pab:* Maur—; *Punjab:* Tukhmmalanga—.

5. **Salvia cabulica** Benth. in DC. Prodr. XII (1848) 268.

Shrubby, much-branched, softly villous-canescent; young branches slightly rigid, subsimple. Leaves small, bigger ones 12-14 mm. long, cordate, ovate-orbicular, crenate, slightly rugose, petiolate. Verticillasters 2-3, terminal, 4-2-flowered, approximate. Calyx pedicellate 10 mm. long, campanulate, bilabiate down one-third; upper lip shortly 3-dentate, lower bifid, all teeth mucronate. Corolla 2.2 cm. long.

Distribution: Baluchistan.—Afghanistan.

In Baluchistan, the plant is considered a cure for fever, also for colds and lung diseases (Hughes-Buller).

Baluchistan: Mateto—.

6. **Salvia spinosa** Linn. Mant. 511.

Stem erect, forming a large pyramidal panicle. Leaves appressedly pubescent-canescent, or pale greenish, ovate, subcordate, or rotundate at the base, erose-dentate, often sublobed, lower ones petiolate, upper amplexicaul, acute; floral leaves broadly ovate, acuminate, submembranous, shorter than the calyx. Verticillasters somewhat remote, 4-2-flowered. Calyx viscid-hirsute, tubular, shortly bilabiate; upper lip with 3 subequilong teeth, the lower with 2 triangular-lanceolate spinose ones. Corolla white, 1½ times as long as the calyx, tube naked inside; upper lip subfalcate, abbreviate.

Distribution: Baluchistan.—Mesopotamia, Syria, Arabia.

At Burj in Toba Achakzai, the seed is powdered and applied to the teeth to cure tooth-ache (Hughes-Buller).

Pushtu: Ganacha—; *Quetta-Pishin:* Ganacha—.

7. **Salvia officinalis** Linn. Sp. Pl. (1753) 23.

A hardy, white-woolly undershrub, 15-30 cm. high : stems shrubby, the flowering branches tomentose-pubescent. Leaves entire, 2.5-3.8 cm. long, petiolate, oblong, base narrowed or rotund, the

lower white-tomentose or lanate beneath or on both surfaces; the floral leaves sessile, ovate, acuminate at the base, membranaceous, striate; racemes subsimple; floral whorls few, many-flowered, distinct. Calyx campanulate, membranaceous, coloured, striate, pubescent or villous, the teeth subulate-acuminate. Corolla purple, blue or white.

Distribution: Mediterranean region. Introduced into some Indian gardens.

Sage is feebly tonic, astringent, and aromatic.

The leaves make an excellent gargle for relaxed throat and tonsils, also for ulceration of mouth and throat. This is a popular medicine all over Europe. A strong infusion of the herb is used to dry up the breast milk for weaning. This is an excellent lotion for ulcers, and to heal raw abrasions of the skin. The herb may be applied externally in bags as a hot fomentation.

In Sussex, a peasant will munch Sage leaves on nine consecutive mornings, whilst fasting, to cure ague.

In Spain, an infusion of the leaves and flowertops is used as a diaphoretic, stimulant and stomachic.

Catalan: Salvia, Salvia de Arago, Salvia medicinal, Salvia de Moncayo—; *Danish:* Salvia—; *Dutch:* Salie—; *English:* Common Sage, Garden Sage, Red Sage, Sage—; *French:* Grande Sauge, Herbe sacree, Petite Sauge, Sale, Sauge, Sauge franche, Sauge officinale, Sauge de Provenee, The d'Europe, The de France, The de Grece, The de la Grece—; *German:* Fischsalbe, Gartensalbei, Krusefi, Krusesophie, Rauchsalbei, Rauhesalbe, Rauhesalve, Sabikraut, Sælv, Salbe, Salbei, Salveren, Saphedenkraut, Scharlachkraut, Scharlei, Schmalesalbe, Schmalesophie, Selben, Self, Sparlei, Tugendsalbe—; *Greek:* Elalisphakos, Elelisphakon, Elelisphakos—; *Hindi:* Salbias-efakuss—; *Italian:* Salvia—; *Malta:* Common Sage, Salvia, Salvia ta Malta—; *Polish:* Szalwia—; *Portuguese:* Salva, Salvetta—; *Roumanian:* Cinstes, Cinstet, Cocean-capresc, Serialu, Serlaiu—; *Russian:* Schalweja, Salfei—; *Spanish:* Salvia, Salvia de Aragon, Salvia fina, Salvia de Grenada, Salvia de Moncayo, Salvia oficinal, Salvia real, Te indigeno—; *Swedish:* Salvia—.

NEPETA Linn.

Erect or prostrate herbs. Leaves opposite. Whorls axillary or terminal; flowers blue, yellow or white. Calyx tubular, 15-ribbed, equally 5-toothed, or 2 lower teeth narrower. Corolla-tube not annulate within, throat inflated; upper lip straight, notched or 2-fid; lower 3-fid, midlobe largest. Stamens 4, ascending under the upper lip or exserted, upper pair longest; anther-cells diverging. Style-lobes subulate. Nutlets smooth.—Species 150.—Temperate Europe, N. Africa, Asia.

1. Leaves subsessile, elliptic-oblong or oblong-cordate, tip rounded or acute, pectinately crenate .... 1. *N. elliptica.*
2. Leaves shortly petioled, ovate-cordate, obtuse, crenate .... 2. *N. ciliaris.*
3. Leaves petioled, broadly ovate- or orbicular- cordate, obtuse, crenate .... 3. *N. ruderalis.*
4. Leaves small, ovate, crenate, rugose, lower ones shortly petiolate, the rest sessile .... 4. *N. glomerulosa.*

Stimulant, and tonic, diuretic and aperient, bechic and vulnerary. The following species are used medicinally in Europe—*N. cataria* Linn., *N. glechoma* Benth., *N. italica* Linn.—; in China—*N. glechoma* Benth., *N. japonica* Maxim., *N. tenuifolia* Benth.—; in Annam and Malaya—*N. tenuifolia* Benth.—; in the United States of America—*N. glechoma* Benth.—.

1. **Nepeta elliptica** Royle ex Benth. in Hook. Bot. Misc. III, 378.—PLATE 765B.

Stems densely hairy, ascending. Leaves sessile, hairy or pubescent, ovate-oblong, 1.3-3.8 cm.; teeth small, close-set, regular, acute. Whorls sessile, crowded in terminal spikes up to 7.5 cm. long, usually interrupted at the base. Flowers about 8 mm. long, pale blue or nearly white. Calyx hairy; teeth linear-lanceolate, as long as the tube, acute. Corolla-tube hardly longer than the calyx.

Distribution: W. temperate Himalaya, from Kashmir to Kumaon, 5,000—8,000 ft.

One drachm of seeds infused in cold water is used in dysentery. *Punjab:* Tukhmmalanga—.

2. **Nepeta ciliaris** Benth. in Wall. Pl. As. Rar. I, 64.—PLATE 765C.

Softly tomentose; stems erect, 0.6-0.9 m. Leaves stalked, cordate, broadly ovate, 2.5-3.8 cm., crenate, obtuse. Whorls sessile, crowded in terminal spikes more or less interrupted near the base. Flowers 8 mm. long, lilac; bracts often tinged with purple. Calyx densely covered with long hairs; teeth linear-lanceolate, shorter than the tube, often tinged with purple. Corolla hairy; tube longer than the calyx.

Distribution: W. temperate Himalaya, from Kashmir to Garhwal, 6,000—8,000 ft.

The medicinal properties are the same as those of *Hyssopus officinalis* (Yunani).

It is given in sherbet for fever and cough (Stewart).

Punjab: Zufa yabis—; *Sind:* Jufa—.

3. **Nepeta ruderalis** Hook. f. Fl. Brit. Ind. IV (1885) 661.—PLATE 765A.

Annual, 15-45 cm. high, branched from the base; branches erect or ascending, obtusely quadrangular, grooved, softly pubescent, often floriferous almost throughout their entire length. Leaves 1.3-5 by 1-3.8 cm., broadly ovate or suborbicular, obtuse, crenate-serrate, green or hoary, base cordate or truncate; petioles 6-3.2 mm. long. Flowers pedicellate, in dense axillary many-flowered pedunculate, often 2-branched cymes, the flowers lateral on the cyme-branches; peduncles of lower cymes often 2.5 cm. or more long, those of the upper cymes short; bracts 5-6 mm. long, linear-lanceolate, acute, densely ciliate; pedicels 0.85 mm. long. Calyx in flower 4 mm. long, pubescent and glandular, 2-lipped; upper lip 2.5 mm. long with 3 triangular aristate teeth, the middle lobe 1.5 mm. long; lower lip 1.5 mm. long with 2 subulate teeth. Corolla bluish purple, pubescent outside, exserted; tube inflated at the throat; upper lip 1.5 mm. long, oblong, 2-fid with obtuse lobes; lower lip 3 mm. long, 3-lobed, the middle lobe broad, emarginate, crenulate, much larger than the 2 small rounded lateral ones. Nutlets mucilaginous when moistened, 1.25-1.5 by 0.85 mm., oblong-ellipsoid, with a white

V-shaped hilum on the inner face near the base, brown, obscurely granulate with whitish spots which show when wetted.

Distribution: Punjab, Bengal, Central India, Deccan.—Afghanistan.

It is largely used in fevers, and as a cardiac tonic. The decoction is used as a gargle in sore throat.

In Nepal, it is taken internally as a remedy for gonorrhœa.

Nepal: Niasbo—; *Punjab:* Badrangboya, Bebrangkhatai, Billilotan—.

4. **Nepeta glomerulosa** Boiss. Diagn. ser. I, 5, 21.—*N. juncea* Benth. in DC. Prodr. XII (1848) 379.

Appressedly white-woolly. Rhizome woody; stems many, thinly virgate, elongate, subsimple, subnude above. Leaves small, ovate, crenate, rugose, lower ones shortly petiolate, the rest sessile. Floral leaves ovate, submembranous. Verticillasters small, dense, the lower 1-2 distant, the others forming an oblong spike. Bracts membranous, ovate-oblong, acute, cucullate, as long as the calyx. Calyx long-hirsute, membranous, striate, suboblique at the mouth, teeth lanceolate-subulate, shorter than the tube. Corolla rose, included in the tube. Nutlets oblong, minutely tuberculate.

Distribution: Baluchistan.—Afghanistan, Persia.

A cure for pneumonia in Bolan, for itch in Sanjawi (Hughes-Buller).

Bolan: Simsok—; *Chiltan:* Bhinjanbutai, Chanjanbutai—; *Quetta-Pishin:* Chinjanbutæ—; *Sanjawi:* Chamjanbot—.

Dracocephalum Linn.

Erect or prostrate herbs. Whorls axillary or terminal, flowers blue, purple or white. Calyx tubular, 15-nerved, 5-toothed; teeth all subequal, or upper much the largest, or 3 upper combined into a broad lip. Corolla-tube not annulate within, upper lip erect notched, lower spreading 3-fid, midlobe largest. Stamens 4, ascending under the upper lip, anther-cells diverging. Style-lobes subulate. Nutlets smooth.—Species 40.—N. temperate.

D. moldavicum Linn. is used medicinally in Germany, Siberia, and South America.

1. **Dracocephalum moldavicum** Linn. Sp. Pl. (1753) 595. —PLATE 766B.

An annual erect herb, quite glabrous. Stem 30-60 cm., branched from the base. Leaves 2.5-5 cm., narrowed into a short slender petiole; lanceolate, obtusely deeply serrate or subpinnatifid. Spikes 10-20 cm., leafy; whorls distinct or distant. Flowers pedicelled, shorter than the floral leaves; bracts lanceolate, teeth long-awned. Calyx coriaceous, 2-lipped, 8 mm., glabrous, upper lip broad, 3-toothed; upper teeth broadly ovate, mucronate. Corolla 2-2.5 cm., blue, tube greatly dilated at the throat. Stamens subexserted. Nutlets 2.5 mm., narrowly oblong, truncate.

Distribution: Kashmir, 7,000—8,000 ft.—Siberia, Dahuria.

The seeds are bitter; astringent, tonic, carminative; good for diseases of the brain (Yunani).

The seeds are used in fevers as a demulcent (Irvine).

In Europe, the plant is considered tonic, astringent, and vulnerary.

Arabic: Asabælfatiyat—; *Hindi:* Tukhmferunjmishk—; *Persian:* Karanfalihostani—; *Spanish:* Melisa de Moldavia, Torongil de Turquia—.

LALLEMANTIA Fisch. et Mey.

Characters of Dracocephalum, but upper lip of calyx with 3 obtuse lobes, of which the lateral are placed under the central.—Species 4.—W. Asia.

The genus exhibits cooling properties.

1. **Lallemantia royleana** Benth. in DC. Prodr. XII (1848) 404.—PLATE 766C.

An erect annual, hoary-pubescent or glabrate, 15-45 cm., stem branched or simple, obtusely angled. Leaves 1.3-2.5 cm., base cordate or narrowed into the petiole; ovate or oblong-obtuse, coarsely

crenate. Bracts small, deciduous, oblong or lanceolate, teeth long-awned. Whorls very numerous in long interrupted narrow spikes. Flowers shortly pedicelled. Calyx 8 mm., erect, rigid. Corolla pale-lilac, tube hardly exserted, limb small. Stamens included. Nutlets 2.5 mm., narrowly oblong, smooth.

Distribution: Baluchistan, Punjab Plains and Hills.—Afghanistan, Persia, Turkestan.

The seeds are tasteless; aphrodisiac; useful in diseases of the heart and brain, insanity, griping, bleeding gums, gleet, thirst, bronchitis, tonic to the liver (Yunani).

The seeds are used as cooling and sedative remedies (Stewart).

Bombay: Tukhmibalangu—; *Harboi Hills:* Fuchkin, Yakhtali—; *Hindi:* Ghareikashmalu, Tukhmlealanga—; *Kashmir:* Tukhmibalungu—; *Punjab:* Ghareikashmalu, Tukhmbalangu, Tukhmmalanga—; *Persian:* Tukhmibalangu—; *Urdu:* Balanga—.

BRUNELLA Tourn. ex Linn.

Perennial herbs. Whorls in dense heads; bracts orbicular; flowers purplish, rarely white. Calyx reticulate, 2-lipped, closed in fruit, upper lip flat, 3-toothed, lower 2-lobed; throat naked. Corolla ascending, tube annulate at the base within; upper lip erect, concave; lower spreading, side lobes deflexed, midlobe concave. Stamens 4, exserted, filaments 2-fid, lower arm antheriferous; anthers conniving, cells diverging. Disk erect, symmetrical. Style-lobes subulate. Nutlets oblong, smooth.—Species 5.—More or less cosmopolitan.

B. vulgaris Linn. is used medicinally in Europe, China, and Malaya.

1. **Brunella vulgaris** Linn. Sp. Pl. (1753) 600; Wight. Ic t. 1448.—PLATE 767.

A thinly hairy, erect or ascending herb, 10-30 cm. Leaves stalked, ovate or oblong, 2.5-5 cm. entire or toothed, acute or obtuse. Flowers 1.3-2 cm. long, violet-purple, in whorls of 6 crowded in erect, terminal spikes 2.5-5 cm. long and bearing a pair of sessile leaves at the base; floral leaves bract-like, hairy, purple-margined,

broadly ovate, acute, overlapping. Calyx tinged with purple, bell-shaped, 2-lipped; upper lip broad, 3-toothed; lower deeply 2-lobed; mouth closed after flowering time. Corolla-tube broad, slightly longer than the calyx; limb 2-lipped, upper lip erect, hood-like, notched, lower spreading, 3-lobed, midlobe largest, minutely toothed. Stamens 4, in unequal pairs, ascending under the upper lip; filaments bearing a small tooth below the anthers.

Distribution: Temperate Himalaya, from Kashmir to Bhutan, 4,000—11,000 ft., Khasia Hills, 4,000—6,000 ft. Nilgiris, Pulneys, Travancore.—N. temperate zone, Andes, Australia.

The seeds have a sharp bitter taste; antipyretic, laxative, tonic, diuretic, parasiticidal; useful in inflammations, diseases of the heart, difficult breathing, lung troubles, bronchitis, muscular pain, insanity, bruises, giddiness, piles, diseases of the liver, spleen nose, ear; remove white patches in the cornea, weakness of eyesight due to old age (Yunani).

Regarded by the Punjab Himalayan hill tribes as expectorant and antispasmodic (Stewart). The green leaves smeared with castor oil and warmed over the fire are applied externally to the anus in cases of painful piles.

The plant is used for fevers and coughs in China and Malaya, and is considered there antirheumatic, alterative, and tonic.

Arabic: Anasulrawah—; *Chinese:* Hsia K'u Ts'ao—; *English:* Black Man, Carpenter's Herb, Heal-all, Hook-heal, Self-heal, Sicklewort—; *French:* Bonnerette, Bonnette, Brunelle, Brunellier, Brunette, Charbonnière, Petite consoude, Petite consyre, Prunelle—; *German:* Braunelle, Braunheil—; *Hindi:* Dharu—; *Italian:* Brunella—; *Malaya:* Lo han tsao, Look ham chow—; *Persian:* Ustekhadus—; *Punjab:* Austakhadus—; *Roumanian:* Busuioc de camp, Busuioc marunt—; *Sind:* Ustukhudus—; *Urdu:* Ustekhadus—.

Marrubium Tourn. ex Linn.

Perennial tomentose or woolly herbs. Whorls axillary, flowers small. Calyx tubular, 5-10-nerved; teeth 5-10, equal, short, subspinescent. Corolla short, tube naked or annulate within, upper

lip erect, lower spreading, midlobe largest. Stamens 4, included; anthers glandular, cells diverging. Style-lobes short, obtuse. Nutlets obtuse.—Species 30.—Europe, N. Africa, temperate Asia.

Tonic and cholagogue.

M. Alysson Linn. is used medicinally in Spain; *M. vulgare* Linn. in Europe, California, and South Africa.

The leaves of *M. vulgare* Linn. (*M. hamatum* Kunth.) are official in Portugal.

1. **Marrubium vulgare** Linn. Sp. Pl. (1753) 583.—PLATE 768.

A perennial plant, 40-60 cm. high, or sometimes somewhat more; stems stout, white-woolly, ascending, simple or sparingly branched. Leaves crenate, soft-villous, greyish above, whitish below, orbicular to ovate-orbicular, 10-30 cm. long, the lower petioled, often cordate. Whorls dense, globular, distant, rather shorter than the cuneate-oblong, floral leaves; bracts subulate, hooked at the apex; Calyx-teeth 10, spreading, hooked at the apex, the alternate ones shorter, the longest one thrid as long as the 4 mm. long tube; corolla white, with minute limb.

Distribution: Kashmir, 5,000—8,000 ft.—Westward through Europe and N. Africa.

The plant has a bitter taste; tonic, diuretic, carminative, expectorant, detergent, antipyretic; useful in pains of the joints, bronchitis, diseases of the liver, spleen and uterus; cleanses foul ulcers and diseased mucous surfaces.—The leaves are purgative, maturant, detergent; useful in inflammations, sore eyes, night blindness; strengthen the teeth; facilitate expulsion of the fœtus (Yunani).

The herb is a bitter tonic, expectorant, and diuretic. It is perhaps the most popular of herbal pectoral remedies in England. It is exceedingly valuable in coughs, cold and pulmonary affections. In many parts, it is brewed and sold as Horehound Ale, making an appetising and healthful beverage. Also a candy is prepared, and if properly made, is no doubt efficacious.

The infusion is much used in Europe as a domestic remedy for bronchitis with profuse expectoration. It is tonic, and in large doses, purgative.

The Europeans in South Africa use an infusion in febrile conditions, and especially in typhoid fever.

In America, it is generally used in catarrhal states of the air passages.

The plant is especially esteemed by the Spanish-Californians as a remedy for colds and lung troubles.

In Mexico, a preparation made from the leaves is used for rheumatism; it is added to mescal and applied as a liniment.

Afrikaans: Koorsbossie—; *Arabic:* Farasiym, Hashishatelkalb, Sufelard—; *Catalan:* Malrubi blanch, Malrubins—; *Danish:* Hvidmarru, Hvidrubike, Rubike—; *Dutch:* Gemeene malrove—; *English:* Common Horehound, Hoarhound, Horehound, White Hoarhound—; *French:* Blanc roubi, Blanc rubi, Bonhomme, Bon riblet, Bon rubi, Grand bonhomme, Herbe vierge, Marchemin, Marinclin, Marrochemin, Marrochen, Marrube, Marrube blanc, Marrube bonhomme, Marrube commun, Mont blanc—; *German:* Andornkraut, Berghopfen, Chinakraut, Gotteshuelfe, Gottvergess, Gutvergess, Kuckskraut, Lungenkraute, Maeuseoehrchen, Marienwurzelkraut, Markobell, Nagelkraut, Siebennagelspitzer, Wasserdorn, Weisse Leuchte, Weisser Andorn, Weisser Anton, Weisser Daurand, Weisser Dorand, Weisser Gottvergess, Weisser Winderthon, Weissleuchterkraut—; *Greek:* Prasion—; *Hindi:* Paharigandana—; *Italian:* Erba apiola, Marrobio, Marrobio bianco—; *Languedoc:* Maltrasté, Mariblé—; *Malta:* White Horehound, Marrobio, Robbio, Erba apiola, Marrubija, Marrubjabajda—; *Persian:* Afnanesar—; *Polish:* Szanta biala—; *Portuguese:* Marroio, Marroio branco—; *Provence:* Bouan rible, Mentastre, Marroufe, Marrubi, Moun blanc—; *Roumanian:* Catusnica, Catusnica selbatica, Iarba flocoasa, Iarba mitei, Iarba vintului—; *Russian:* Marrub, Schandra—; *South Africa:* Horehound, Marvel, White Horehound—; *Spanish:* Marrubio blanco—; *Swedish:* Andorn—; *Urdu:* Farasiym—.

Anisomeles R. Br.

Tall erect branching coarse often villous herbs. Flowers in axillary whorls or lax-flowered branched paniculate cymes. Calyx

ovoid or tubular, straight; limb equally 5-toothed, but little enlarged in fruit. Corolla 2-lipped; tube short, annulate within; upper lip erect, entire, short; lower broad, spreading, 3-lobed, the lateral lobes small, the middle lobe large, 2-fid. Stamens 4, didynamous, exserted, the lower pair the longest; anthers of the upper pair 2-celled, those of the lower pair 1-celled, the cells transverse, parallel. Disk equal. Ovary 4-partite; style 2-fid, the lobes equal, subulate. Fruit of 4 ovoid obtuse dry nutlets; basal scar small.—Species 6.—Indo-Malaya, Australia.

1. Leaves ovate, acuminate, crenate-serrate .... 1. *A. indica.*
2. Leaves short-petioled, oblong, linear-oblong or oblong-lanceolate, obtuse, acute or acuminate, crenate or serrate .... 2. *A. malabarica.*

Diaphoretic and antipyretic.

A. ovata R. Br. is used medicinally in Annam, the Philippine Islands, and La Reunion; *A. malabarica* R. Br. too is used in La Reunion.

1. **Anisomeles indica** Ktze. Rev. Gen. Pl. pt. 2, 512.—*A. ovata* R. Br. in Ait. Hort. Kew. ed. 2, III (1811) 364.—PLATE 769 (under *A. ovata* R. Br.).

Suffruticose, 0.6-1.5 m. high, hirsute, pubescent or tomentose, rarely sparsely hairy; stems acutely quadrangular, softly pubescent. Leaves rather thick, 3.8-10 by 2.5-5.7 cm. (sometimes 12.5 by 7.5 cm.), ovate, acute, crenate-serrate, softly pubescent on both sides, base truncate, rounded or subcordate, rarely shortly cuneate; petioles 1.6-3.8 cm. long, densely hairy. Flowers sessile or nearly so, in dense whorls which are distant below but approximated above to form a dense spicate inflorescence; bracts 3-5 mm. long, linear, clothed with long stiff hairs. Calyx 6 mm. long, hirsute with long stiff hairs; teeth lanceolate, acute, nearly as long as the tube, hairy on both sides, ciliate. Corolla 1.6 cm. long, light purple with a deep blue lower lip; tube 4 mm. long; upper lip 6 mm. long, oblong, rounded at the apex; lower lip much longer, 3-lobed, the lateral lobes small, rounded, the middle lobe 5 mm. long, deeply divided into 2 oblong lobes 3 mm. long (making the lower lip 4-lobed). Filaments bearded. Nutlets 2.5 mm. long, broadly ovoid with

rounded ends, subcompressed, the inner face obtusely angled, the dorsal face rounded, smooth, polished, nearly black when ripe.

Distribution: Throughout India, Ceylon.—Malay Archipelago, China, Philippines.

The plant has carminative, astringent, and tonic properties. The essential oil from it is used in uterine affections.

Bombay: Gopali—; *Cantonese:* Ts'in ts'o—; *Chinese:* Ch'ien Ts'ao—; *Malaya:* Hee chin choo—; *Tagalog:* Talingharap—.

2. **Anisomeles malabarica** R. Br. in Bot. Mag. (1819) t. 2071.—PLATE 770.

Shrubby, erect, 1.2-1.8 m. high, densely tomentose or thickly woolly; stems slightly branched, obtusely quadrangular, clothed with soft white woolly hairs. Leaves very thick, 6.3-10 by 2-4.5 cm., oblong-lanceolate, acute, pale above, white below, crenate-serrate, base rounded or shortly cuneate; petioles 1.3 cm. long, stout, softly woolly. Flowers in dense whorls often 3.2 cm. diam., distant below, approximate above, forming a more or less interrupted spicate inflorescence; bracts reaching 1.3 cm. long, linear, acute, densely softly woolly. Calyx 1 cm. long, densely villous; teeth about ½ as long as the tube, narrowly lanceolate, acute, villous on both sides, ciliate. Corolla purple, 2.2 cm. long, slightly pubescent outside; tube 8 mm. long; upper lip 8 mm. long, obtuse; lower lip very large and broad, 3-lobed, the lateral lobes small, rounded, the middle lobe deeply divided at the apex into 2 oblong obtuse lobes. Filaments pubescent. Nutlets 3-4 mm. long, ellipsoid, compressed, the inner face slightly angular, the dorsal face rounded, smooth, polished, brown.

Distribution: Deccan, N. Kanara, S. Carnatic, Malay Peninsula.—Mauritius.

In Southern India, few plants are held in higher esteem, or are more frequently employed in native practice, than this. An infusion of the aromatic bitter leaves is in common use in affections of the stomach and bowels, catarrhal affections and intermittent fevers.

In addition to its internal use in the cure of fevers, patients are made to inhale the vapour of a hot infusion so as to induce copious

diaphoresis. An infusion of the leaves is given to children in colic, dyspepsia and fever arising from teething. A decoction of the plant, or the essential oil distilled from the leaves, is used externally in rheumatism.

In La Reunion, the plant is considered sudorific and antipyretic. It is given for rheumatism.

An infusion of the leaves of this plant is given on the west coast to children in colic, dyspepsia and fever arising from teething. The infusion acts as a diaphoretic. An infusion (1 in 10) was tried in fever accompanying teething and was found useful (Koman).

The root, stem, and leaves are all useless in the antidotal treatment of snake-bite (Mhaskar and Caius) and scorpion-sting (Caius and Mhaskar).

Bombay: Chodhara—; *Canarese:* Karitumbe—; *Deccan:* Mogbirekapatta—; *English:* Malabar Catmint—; *Gujerati:* Gholochodharo, Makhmalichodharo—; *Malayalam:* Karintumpa, Pemarutti, Peruntumpa—; *Marathi:* Chodhara, Pandaachodhara, Sundara, Sundraphul—; *Sanskrit:* Oshthaphala, Vaikuntha—; *Tamil:* Irattaippeymarutti, Peymarutti, Peyverutti, Sadumbai—; *Telugu:* Chinnaranabheri, Magabira, Mogabheri—.

STACHYS Linn.

Herbs or undershrubs. Leaves crenate or serrate. Whorls axillary and in terminal spikes or racemes. Calyx 5-10-nerved, teeth 5 subequal. Corolla with usually a ring of hairs within, throat not dilated, upper lip erect; lower spreading, 3-lobed, midlobe the largest. Stamens 4, ascending; anthers conniving, cells parallel or diverging. Style-lobes subequal. Nutlets obtuse.—Species 200.—Cosmopolitan, excepting Australia.

Emmenagogue and diaphoretic.

The following species are used medicinally in Europe—*S. arvensis* Linn., *S. hirta* Linn., *S. maritima* Linn., *S. recta* Linn., *S. sylvatica* Linn.—; in China—*S. aspera* Michx., *S. sieboldi* Miq.—; in South Africa—*S. aethiopica* Linn., *S. aethiopica* Linn. var. *glandulifera* Skan., *S. rugosa* Ait., *S. rugosa* Ait. var. *linearis* Skan.—.

1. **Stachys parviflora** Benth. in DC. Prodr. XII (1848) 490. —PLATE 766A.

Erect herbs densely clothed with flocculent white wool, branched from the base and upwards. Stem and branches very stout, nearly terete. Leaves 2.5-7.5 cm., sessile, thick, elliptic oblong or oblong ovate, or lanceolate, subacute entire or serrate, glabrous and shining or cottony above, upper woolly all over. Floral far exceeding the flowers. Whorls distant, 2-4-flowered. Calyx 3-4 mm., densely woolly, cupular, teeth short, acute; fruiting closed over the nutlets with the teeth incurved. Corolla red purple, or white or yellow, lips very small, upper short, rounded. Nutlets enclosed in the ovoid or subglobose calyx, usually 2, turgid, plano-convex, 4 mm., long, grey, granulate.

Distribution: Punjab Plains and Hills.—Afghanistan.

In the Salt Range, the bruised stems are applied to the guineaworm (Stewart).

Punjab: Baggibuti, Kirimar—; *Pushtu:* Speraghunai—.

LEONURUS Linn.

Erect, leafy, stout herbs. Leaves lobed. Whorls axillary, dense-flowered, distant; bracts subulate, flowers small. Calyx 5-nerved, turbinate; teeth 5, spreading, spinescent. Corolla-tube naked or annulate within, upper lip entire, erect; lower 3-fid, midlobe obcordate. Stamens 4; anthers conniving, cells transverse. Style-lobes obtuse or subulate. Nutlets triquetrous, truncate, smooth—Species 8.—Europe, Asia, and tropics.

Tonic, alterative, vulnerary, and a general remedy in puerperal and menstrual diseases.

L. macranthus Maxim. and *L. sibiricus* Linn. are used medicinally in China, and *L. sibiricus* is also used in Malaya; *L. cardiaca* Linn. is used in Europe.

OFFICIAL:—The herb of *L. lanata* Pers. & Spreng.=*Ballota lanata* Linn. (Hungary).

1. **Leonurus sibiricus** Linn. Sp. Pl. (1753) 584.—PLATE 771B.

Annual, 0.6-1.8 m. high; stems obtusely quadrangular, furrowed, usually softly pubescent. Leaves 3.8-10 cm. long, palmatipartite with linear incised segments, glabrous or nearly so above, pale and more or less pubescent on the veins beneath; nerves strong below; petioles reaching 5 cm. long. Flowers in axillary whorls; upper floral leaves usually entire; bracts 5 mm. long, spinescent. Calyx 6-8 mm. long, glabrous or slightly pubescent, 5-nerved; tube 5 mm. long; teeth spinescent from a triangular base. Corolla red, reaching 1.3 cm. long; tube about equalling the limb, annulate within; upper lip obovate, galeate, entire, pubescent; lower lip about equalling the upper, 3-lobed, the middle lobe obcordate, the 2 lateral lobes smaller, rounded. Nutlets 2.5 mm. long, triquetrous, truncate.

Distribution: Plains of India from Bengal and Sylhet to Coorg, but doubtfully indigenous.—Tropical Asia, Africa and America.

The root and leaves are bitter and used as a febrifuge.

In Chinese medicine the seeds are considered to be constructive and aphrodisiac. The dried plant is prescribed as a tonic, alterative, vulnerary, and general remedy in puerperal and menstrual diseases.

Cantonese: Ch'ung wai—; *Chinese:* Ch'ung Wei, I Mu, K'uen Ts'ao—; *Malay:* Seranting, Tebung aga—; *Malaya:* Choong wai, Kwan chor—; *Patna:* Guma—; *Tagalog:* Camariangsongsong—.

ROYLEA Wall.

Species 1.—Himalaya.

1. **Roylea elegans** Wall. Pl. As. Rar. I, 57, t. 74.—PLATE 772.

An erect shrub, 0.9-1.5 m.; branches terete, pale brown, finely tomentose. Leaves shortly stalked, hairy, ovate, 2.5-3.8 cm., crenate, acute. Flowers 1.3 cm. long white, tinged with pink, in axillary whorls. Calyx-tube cylindric, 10-nerved; lobes 5, erect, oblong, net-veined, obtuse. Corolla hairy, hardly longer than the calyx; tube cylindric; limb 2-lipped, upper lip erect, hood-like, entire, lower 3-lobed, spreading, midlobe longest, entire. Stamens 4, in unequal

pairs, ascending under the upper lip, outer or anterior pair longer than the inner.

Distribution: Subtropical W. Himalaya, from Kashmir to Kumaon, 2,000—5,000 ft.

An infusion of the leaves is drunk for contusions produced by blows, and about Kumaon the same preparation is used as a bitter tonic and febrifuge.

Garhwal: Karui, Titpati—; *Hindi:* Patkarru—; *Jaunsar:* Karanoi—; *Kumaon:* Kauri, Kitpatti—; *Punjab:* Kaur, Kauri—.

Otostegia Benth.

Shrubs. Whorls axillary, many-flowered; outer bracteoles often spinescent. Calyx 10-nerved; limb dilated, membranous; upper lip very short, 3- angled or -toothed; lower very large, broad, angled or shortly 4-toothed. Corolla-tube included, annulate within; upper lip erect, concave, crown villous; lower spreading, 3-fid, midlobe broad. Stamens 4, ascending; anthers conniving, cells at length divaricate. Style subequally 2-fid. Nutlets obovoid, obtuse.—Species 10. —W. Asia, Abyssinia.

1. Leaves subsessile, elliptic-lanceolate, obtuse, quite entire .. 1. *O. limbata.*
2. Leaves subsessile, oblong or elliptic, entire spinulose at apex .... 2. *O. aucheri.*

The genus is therapeutically inert.

1. **Otostegia limbata** Hook. f. Fl. Brit. Ind. IV, 680.—Plate 771A.

A small grey, hoary spiny bush, branches tomentose, white, terete, spines 1.3-2 cm. Leaves subsessile elliptic-lanceolate, obtuse, quite entire, nerveless, 2.5 cm., base narrowed, hoary on both surfaces; floral exceeding the calyces. Lower bracts spinescent, upper dilated, pungent. Whorls distant. Calyx villous, throat bearded, flowering 4 mm., turbinate with a broad membranous 5-toothed limb, which in fruit expands into a reticulated 5-angled cup, 1.7 cm. diam., with often toothed margins. Corolla 1.3 cm., tube short, upper lip very long, villous. Stamens exserted. Nutlets 5 mm., flattened, smooth.

Distribution: Lower hills of the Punjab west of the Jhelum to the Salt Range.

The juice of the leaves is applied to children's gums, and to ophthalmia in man and beast (Stewart).

Hazara: Chitiboi—; *Punjab:* Agzhan, Awanibuti, Bui, Jandi, Kandiari, Lana, Phutkanda—.

2. **Otostegia aucheri** Boiss. Diagn. ser. I, 5, 40.

Shrubby, much-branched below, branches elongate, striate, almost glabrous. Spines thin, spreading, shorter than the leaves. Leaves 1.2-2 cm. long, 4-6 mm. broad, slightly fleshy, subsessile, oblong or elliptic, entire, spinulose at apex, green, minutely puberulous. Axillary fascicles opposite, sub-3-flowered, bracts subulate, shorter than the fascicles. Calyx glabrous, limb bilabiate, upper lip herbaceous, ovate-triangular, entire, mucronate, 2-3 times shorter than the tube, lower lip membranous, reticulate, 3-lobed, midlobe subquadrate, retuse, as long as the tube, lateral ones much shorter, ovate, mucronate.

Distribution: Baluchistan.—S. Persia.

At Kohlu in Baluchistan, the drug is administered in suppressed small-pox if the pox do not appear, after which the pox appear (Hughes-Buller).

Kohlu: Suraghzai—.

Leucas R. Br.

Herbs or undershrubs usually woolly or villous. Flowers usually white, in axillary generally distant whorls. Calyx 10-nerved, striate; mouth equal or oblique, equally or unequally 6-10-toothed. Corolla 2-lipped; tube included, annulate or naked within; upper lip erect, concave, externally villous; lower lip spreading, 3-fid, the midlobe large. Stamens 4, didynamous, the lower pair the longest; filaments ascending; anthers conniving, the cells divaricate, at length confluent. Disk entire or lobed, equal or glandular in front. Ovary 4-partite; style subulate at the apex, the upper lobes obsolete. Fruit of 4 ovoid triquetrous obtuse dry nutlets; basal scar small.—Species about 100. —Chiefly Asiatic and African.

A. Calyx-mouth oblique
  I. Mouth of calyx much produced below .... 5. *L. urticaefolia.*
  II. Mouth of calyx produced above
    Calyx-teeth very short
      a. Calyx-mouth not villous within
        1. Calyx smooth below, ribbed and hispid above .... 3. *L. aspera.*
        2. Calyx smooth throughout or nearly so. Calyx-mouth very oblique .... 4. *L. linifolia.*
      b. Calyx-mouth villous within
        1. Leaves linear, less than 13 mm. broad, whorls less than 2.5 cm. diam.; bracts linear, 6 mm. long .... 2. *L. zeylanica.*
        2. Leaves ovate, more than 13 mm. broad, crenate-serrate, whorls more than 2.5 cm. diam.; bracts lanceolate, more than 6 mm. long .... 1. *L. cephalotes.*

B. Calyx-teeth stellately spreading in fruit, whorls terminal and axillary
    Hairs on the stem erect or spreading. Calyx 5-10 mm. long .... 6. *L. stelligera.*

Stimulant and diaphoretic.

L. aspera Spreng. is used medicinally in the Philippine Islands, *L. martinicensis* R. Br. in Brazil and South Africa, *L. decurvata* Baker in Nyasaland.

1. **Leucas cephalotes** Spreng. Syst. II (1825) 743; Wight Ic. t. 337.—Plate 773.

An annual hairy and pubescent herb 0.6-0.9 m. high; stems and branches obtusely quadrangular, hairy with spreading hairs. Leaves 3.8-7.5 by 1.3-2.5 cm., ovate or ovate-lanceolate, subacute, membranous, more or less pubescent, crenate-serrate, base tapering; petioles 6-13 mm. long. Flowers sessile, in large globose dense terminal whorls 2.5-5 cm. in diam.; floral leaves like the cauline, the uppermost coming out from the top of the verticil; bracts imbricate, foliaceous, green, thin, membranous, 13-16 by 2.5-5 mm., lanceolate, acute, awned, reticulately veined, ciliate. Calyx tubular, slightly curved, reaching 1.6 cm. long, the lower half of the tube quite glabrous, membranous, and smooth outside, the upper half pubescent outside and inside; mouth oblique, the villi nearly as long as the teeth; teeth subequal, 1.25 mm. long, narrowly triangular-subulate. Corolla 2 cm. long; tube less than a 1.3 cm. long, obliquely annulate

about the middle; upper lip 4 mm. long, white-woolly; lower lip nearly twice as long as the upper, the middle lobe large, truncate, the lateral lobes very small. Nutlets 3 mm. long, obovoid-oblong, rounded at the apex, the inner face angular, the dorsal face rounded, smooth, brown.

Distribution: Punjab, Bengal, Assam, Himalaya, Rajputana Desert, Kathiawar, Gujarat, all plains districts of Madras Presidency.—Afghanistan.

The plant has a pungent taste with a flavour; heating, indigestible; causes "vata" and "pitta"; laxative, anthelmintic, stimulant, diaphoretic; useful in bronchitis, jaundice, inflammations, asthma, dyspepsia, paralysis, leucoma.—The leaves are also useful in fevers and urinary discharges (Ayurveda).

The plant is stimulant and diaphoretic.

The fresh juice is used in certain localities as an external application in scabies. The flowers are administered in the form of a syrup as a domestic remedy for coughs and colds.

The leaves, in combination with other drugs, are prescribed for scorpion-sting (Vagbhata); but they are not an antidote to scorpion-venom (Caius and Mhaskar).

Bengal: Barahalkasa, Ghalaghase—; *Gangpur:* Nakiara, Nakingara—; *Gujerati:* Doshinokubo, Khetraukubo, Kubi, Kubo—; *Hindi:* Deldona, Dhurpisag, Goma, Guma, Motapati—; *Khandesh:* Kedari—; *Marathi:* Deokhumba, Kumbha, Shetvad, Tumba—; *Mundari:* Bananaki, Gomanaki—; *Punjab:* Chatra, Guldoda, Maldoda, Phuman, Sisalius—; *Sanskrit:* Chhatraka, Chhatrani, Chitrakshupa, Chitrapatrika, Drona, Dronapushpi, Kaundinya, Kshavapatri, Kumbhayoni, Kumbhayonika, Kurumba, Kurumbika, Palindi, Phalepushpa, Shvasanaka, Supushpi, Vrikshasaraka—; *Santali:* Andiadhuruparak—; *Telugu:* Peddatumni, Tumni—.

2. **Leucas zeylanica** R. Br. Prodr. (1810) 504; Wight Ic. t. 176.—PLATE 774.

Annual, erect, 15-45 cm. high, hispid with long hairs, much-branched from near the base; branches quadrangular, grooved, hispid with long spreading hairs. Leaves subsessile, variable, 2.5-7.5 by 0.8-1.3 cm., linear or linear-lanceolate, obtuse, the margins often

slightly recurved, entire or serrulate, hispid on both sides, ciliate with often bulbous-based hairs, base tapering; midrib conspicuous beneath, hairy. Flowers sessile or nearly so, usually in terminal whorls 1.3-2 cm. diam.; bracts 6 mm. long, linear, spinous-pointed, ciliate with long bulbous-based hairs. Calyx 6 mm. long, turbinate, slightly curved, the lower part glabrous or slightly pubescent outside, the upper part with a few long scattered spreading hairs; mouth broad oblique, the upper part projecting forward, villous, the villi shorter than the calyx-teeth; upper tooth of calyx longer than the others, 1.25 mm. long, triangular, acute, the other teeth subequal, about 0.85 mm. long, subulate. Corolla white, 2 cm. long; tube 6 mm. long, the upper part enlarged, pubescent; upper lip 5 mm. long, densely white-woolly, the middle lobe broadly obovate, cuneate, rounded or sub-truncate, emarginate, the lateral lobes very small. Nutlets 3 mm. long, obovoid-oblong, rounded or truncate at the apex, the inner face sharply angular, the dorsal face rounded, smooth, brown.

Distribution: Assam, Burma, Chittagong, S. M. Country, W. Ghats of Madras Presidency, Travancore, Ceylon.—Malaya, China.

In Ceylon, the leaves are bruised and a teaspoonful of the juice given, which is sniffed up as a remedy in snake-bite. The juice is also employed in headache and colds.

The leaves are useless as an errhine in the treatment of snake-bite (Mhaskar and Caius).

Ceylon: Mudittumbei—; *Sinhalese:* Gattatumba, Getatumba—.

3. **Leucas aspera** Spreng. Syst. II (1825) 743.—*Phlomis esculenta* Roxb. Fl. Ind. III (1832) 10.—Plate 775.

A variable annual 15-45 cm. high; stem erect, usually much diffusely branched from below, stout, hispid or scabrid; branches quadrangular, hispid. Leaves subsessile or shortly petiolate, 2.5-7.5 by 0.6-1.3 cm., linear-oblong or oblong-lanceolate, obtuse, entire or crenate, more or less hairy, base tapering; petioles 2.5-6 mm. long. Flowers sessile or nearly so, in terminal and axillary whorls reaching 2.5 cm. diam.; bracts up to rather more than 6 mm. long, linear, acute, bristle-tipped, ciliate with long slender hairs. Calyx variable, tubular, 8-13 mm. long; tube curved, contracted above the nutlets,

the lower half usually quite glabrous and membranous, the upper half ribbed, hispid or scabrid; mouth small, very oblique, not villous, the upper part produced forward; teeth small, triangular, bristle-tipped, ciliate, the upper tooth the largest. Corolla white, 1 cm. long; tube 5 mm. long, enlarged and pubescent above, annulate about the middle; upper lip 3 mm. long, densely white-woolly; lower lip about twice as long, the middle lobe obovate, rounded, the lateral lobes small, subacute. Nutlets 2.5 mm. long, oblong, subtruncate at the apex; inner face sharply angular, the dorsal face rounded, smooth, brown.

Distribution: More or less throughout India in the plains.—Mauritius, Java, Philippines.

The leaves are said to be useful in chronic rheumatism. The juice is applied in psoriasis and other chronic skin eruptions.

The plant is erroneously reputed to be antidote to snake-venom (Mhaskar and Caius).

Bengal: Chotahalkusa—; *Bombay:* Tamba—; *Deccan:* Thurduribaji—; *Hindi:* Chotahalkusa—; *La Reunion:* Herbe à mouches, Herbe Tombe, Tombe—; *Mundari:* Gomaara—; *Sadani:* Gumhasag—; *Tagalog:* Carucansoli, Pansipansi, Solasolasian—; *Tamil:* Tumbai—; *Telugu:* Tummachettu—; *Visayan:* Paipaisi, Pansipansi, Paypaysi—.

4. **Leucas linifolia** Spreng. Syst. II (1825) 743.—Plate 776.

Herbaceous, erect, slightly pubescent or tomentose, 0.3-0.75 m. high, usually branched; branches quadrangular, pubescent. Leaves 4.5-9 by 0.6-1.3 cm., linear-lanceolate, obtuse, entire or remotely serrate, appressedly pubescent or nearly glabrous, base tapering; petioles 0-1.3 cm. long. Flowers subsessile or shortly pedicellate, in axillary and terminal whorls 1.3-2 cm. diam., towards the ends of the branches; bracts 5-8 mm. long, narrowly linear-subulate, bristle-tipped, finely pubescent. Calyx 1 mm. long from the base to the top of the uppermost tooth, 4-5 mm. long from the base to the top of the lowest tooth, entirely glabrous or slightly pubescent; mouth glabrous, very oblique, contracted; the upper tooth very large, very acute, much produced forwards, the other teeth minute, distant,

erect along the oblique margin. Corolla white, nearly 1.3 cm. long; tube 6 mm. long, annulate inside about the middle; upper lip 5 mm. long, white-woolly; lower lip 6 mm. long, the middle lobe large, obovate, rounded, the lateral lobes small. Nutlets 3 mm. long, oblong, rounded at the apex, the inner face slightly angular, the dorsal face rounded, brown.

Distribution: More or less throughout India.—Mauritius, Malaya.

The therapeutic properties are the same as those of *L. cephalotes* (Ayurveda).

The leaves have a bad taste; expectorant, anthelmintic, aphrodisiac, carminative, laxative, stomachic, tonic; useful in piles and sore eyes.—The seeds are aphrodisiac (Yunani).

The natives of Central India believe that the leaves, when roasted and eaten with salt, have febrifugal properties (Duthie).

At Lakhimpur in Assam, it is used for loss of appetite. The leaves are wrapped up in a plantain leaf, heated, and then eaten. The first effect of this treatment is that the appetite decreases to such an exent that the patient is unable to take any food at all, on the second day it passes off and he takes food with avidity (Carter).

The leaves are equally useless in the treatment of snake-bite whether given internally, or used as an errhine or a collyrium, or applied locally to the part bitten (Mhaskar and Caius).

Assam: Dron—; *Bengal:* Halkasa, Halkussa—; *Deccan:* Goma—; *Gond:* Gumi, Kumbha—; *Gujerati:* Jhinanpannikubo—; *Hindi:* Guma, Halkusa, Kumbha—; *Lakhimpur:* Guma—; *La Reunion:* Herbe a mouches, Herbe Tombe, Tombe—; *Marathi:* Kuva—; *Phillippines:* Parnipansi—; *Sanskrit:* Dronapushpi, Kumbhi, Rudrapushpa—; *Telugu:* Pulatumni—; *Urdu:* Guma—.

5. **Leucas urticæfolia** R. Br. Prodr. (1810) 504; Wight Ic. t. 1451.

A finely tomentose or hoary branched annual. Stems obtusely quadrangular, finely pubescent. Leaves thin, 4.5-7.5 by 2.5-3.8 cm., ovate, acute, coarsely crenate-serrate, more or less pubescent, base acute or rounded; petioles 1.3-2.5 cm. long. Flowers in many-flowered dense distant globose whorls reaching 2.5 cm. diam.; bracts

1 cm. long, linear-lanceolate, acute, aristate, substipitate, ciliate, reticulately veined. Calyx 8-13 mm. long, cylindric, pubescent or villous; mouth very oblique, about 10-toothed, somewhat 2-lipped, the upper lip very small with minute spinescent teeth, the lower membranous, reticulately veined, much prolonged, the 3 lowest teeth the largest, spinescent from a triangular base. Corolla white; tube 5 mm. long, not annulate within; upper lip obovate, concave, externally villous; lower lip 3-lobed, the middle lobe large, 2-fid, the lateral lobes small, obtuse. Nutlets 2 mm. long, obovoid-oblong, obtuse, trigonous, obliquely truncate and glandular at the apex, smooth, brown.

Distribution: Bengal, Punjab, Baluchistan, Sind, Rajputana Desert, Gujarat, Deccan, Carnatic.—Arabia, Abyssinia.

At Gomawal in Baluchistan, the plant is used as a cure for fever (Hughes-Buller).

Gujerati: Kubo—.

6. **Leucas stelligera** Wall. Pl. As. Rar. I (1830) 61.

Herbaceous, erect, branched, softly pubescent or villous, 60-90 cm. high; stems and branches obtusely quadrangular, hairy with erect and spreading hairs. Leaves 5-10 by 1-2.5 cm., elliptic-lanceolate or oblong-lanceolate, obtuse or subacute, obtusely serrate, green above, pale beneath, clothed on both sides with long soft hairs, base tapering into the petiole; nerves numerous, prominent beneath, impressed above; petioles 3-13 mm. long. Flowers sessile, in dense many-flowered terminal and axillary whorls reaching sometimes 3.8 cm. diam.; bracts reaching 6 mm. or more long, linear, revolute at the apex, densely ciliate. Calyx 5-10 mm. long, pubescent or tomentose, glandular; mouth truncate, densely hairy within with erect hairs; teeth about 1.6 mm. long, linear, soft, densely ciliate, stellately spreading in fruit, the tips revolute. Corolla white, rather less than 1.3 cm. long; tube rather more than 6 mm. long, annulate below the middle; lips of limb nearly equal, the upper very densely woolly with long white hairs, the middle lobe of the lower lip sub-orbicular, shortly 2-fid, the lateral lobes triangular-oblong, obtuse.

Nutlets 2.5 mm. long, oblong-obovoid, rounded at the apex, the inner face angular, the dorsal face rounded, smooth and shining, brown.

Distribution: W. Peninsula.

The plant has stimulant, carminative, and emmenagogue properties.

Gujerati: Dungaraukubo—; *Marathi:* Barumbi, Guma—; *Persian:* Mishkitaramshi—.

LEONOTIS R. Br.

Herbs or shrubs. Flowers large, scarlet or yellow, in axillary densely many-flowered whorls; bracts numerous, slender. Calyx 10-nerved; tube often incurved; mouth oblique, with 8-10 rigid teeth, the upper tooth the largest. Corolla 2-lipped; tube exserted; upper lip long, concave with a villous crown; lower lip small, 3-lobed, the middle lobe the largest. Stamens 4, didynamous; lower pair longer, ascending; anthers connivent, the cells divaricate. Disk equal. Ovary 4-partite; style subulate, the upper lobe very short. Fruit of 4 oblong or ovoid or obovoid dry angular obtuse or truncate nutlets; basal scar small.—Species 15.—Tropics and S. Africa.

L. dysophylla Benth., *L. leonotis* R. Br., *L. leonurus* R. Br., *L. microphylla* Skan., *L. mollis* Benth. are used medicinally in South Africa; *L. nepetæfolia* Br. is used in Madagascar and Brazil.

1. **Leonotis nepetæfolia** R. Br. in Ait. Hort. Kew. ed. 2, III (1811) 409; Wight Ic. t. 867; *Phlomis nepetæfolia* Roxb. Fl. Ind. III (1832) 8.—PLATE 777.

A tall erect plant 1.2-1.8 m. high; stem stout, obtusely quadrangular with thickened angles, deeply sulcate, finely pubescent. Leaves 6.3-15 by 3.8-10 cm., membranous, ovate, acute, coarsely crenate-serrate, finely pubescent on both sides, base shortly cuneate, running down into the petiole; petioles 2.5-10 cm. long, winged in the upper part. Flowers in axillary dense globose many-flowered whorls 3.8-6.3 cm. diam.; floral leaves lanceolate, deflexed; bracts reaching 16 by 1.5 mm. linear, strongly spinous-pointed, deflexed;

pubescent. Calyx 2 cm. long, ribbed, tubular, incurved, the lower part puberulous, the upper part densely pubescent or villous and also bristly with long white hairs; tube reticulately veined within, not villous at the oblique mouth; teeth 8-9, unequal, the upper much the largest reaching 8 mm. long, ovate, acute, the others triangular, all with strong sharp spinous points. Corolla 2.5 cm. long, orange-scarlet; tube 1.3 cm. long, glabrous below, densely clothed in the upper part with orange-scarlet hairs, annulate inside with 3 transverse parallel rings of white hairs, the 2 upper rings closer together than the middle and lower rings; upper lip 1.3 cm. long, densely woolly with orange-scarlet hairs; lower lip 4-5 mm. long, deeply 3-lobed, the lobes oblong, obtuse, the middle lobe slightly the longest. Nutlets 4 mm. long, oblong-obovoid, obliquely truncate and with a deep triangular pit at the apex, the inner face sharply angular, the dorsal face rounded, the margins ribbed.

Distribution: Throughout hotter India, cultivated and naturalized, Ceylon.—Tropical Asia, Africa, and America.

In Chota Nagpur, the ashes of the flower-heads are applied to burns and scalds; in Bombay, they are mixed with curds and applied to ringworm and other itchy diseases of the skin.

The plant is used medicinally by the Mundas of Chota Nagpur. The whorl, in flower or in seed, is pounded and fried in Koronj oil; this is rubbed on itch, also on head sores of small children. When a mother's breasts swell and milk does not pass through the nipples, the crushed root is rubbed on the breast (Encyclopædia Mundarica).

In Madagascar, the plant is considered emmenagogue, febrifuge, depurative, narcotic, bitter, and laxative; used in skin diseases, amenorrhœa, and fever.

In Porto Rico, a decoction of the leaves is used as a tonic, the juice is also expressed and taken with limejuice and rum as a febrifuge.

The leaves are used in Brazil, in the treatment of rheumatic affections.

Bengal: Hejurchei—; *Bombay:* Matijer, Matisul—; *Brazil:* Cordao do frade—; *Ceylon:* Kasitumpai—; *Gujerati:* Matijer,

Matisul—; *Hindi:* Hejurchei—; *Marathi:* Dipmal, Ekri—; *Mundari:* Agiajanum, Gharia, Hatusenggelsui, Senggelsui—; *Porto Rico:* Rascamono—; *Sakalave:* Kilanjananahary—; *Santali:* Daredhompo, Jonumdhompo—; *Sinhalese:* Mahayakwanassa—; *Telugu:* Beri, Hanumantabira, Mulugolimidi, Ranabheri—.

EREMOSTACHYS Bunge.

Erect herbs. Leaves, radical broad, toothed or cut; cauline few, smaller. Whorls densely many-flowered, axillary and in a terminal spike. Calyx subcampanulate or upper lip broad membranous; teeth 5, equal, setaceous. Corolla-tube included, upper lip erect, hooded, bearded within; lower spreading, 3-lobed, midlobe largest. Stamens 4, ascending, upper filaments fimbriate or appendaged at the base; anthers conniving, cells divaricate. Disk equal. Style-lobes equal or upper shorter. Nutlets obovoid, triquetrous, truncate, top densely hairy.—Species 40.—Central and W. Asia.

1. Root-leaves pinnatisect, segments sessile pinnatifid .... 1. *E. vicaryi.*
2. Root-leaves pinnatisect, segments pinnatifid or lobulate ...... 2. *E. acanthocalyx.*

The genus is therapeutically inert.

1. **Eremostachys vicaryi** Benth. in Aitch. Cat. Pl. Punjab and Scinde 119.—PLATE 778A.

Erect herbs, stems 0.9-1.5 m., very stout, simple or branched. Leaves radical, 30-45 cm., ovate, pinnatisect; segments or pinnules sessile, glabrous. Petiole strong, base woolly. Lower floral sessile oblong, lobulate. Spikes 20-25 cm., rhachis very stout. Whorls many-flowered, at length distant. Calyx 1.3 cm., campanulate, scurfily tomentose, mouth truncate, shortly 5-crenate, crenatures apiculate; galea of corolla villous and fringed with white hairs.

Distribution: W. Punjab, Salt Range, Baluchistan.

The seeds are given as a cooling medicine (Stewart).

Kila Saifulla: Khurzbin—; *Pab Hills:* Bishkhaf—; *Punjab:* Gurgunna, Khalatra, Rewandchini—.

2. **Eremostachys acanthocalyx** Boiss. Diagn. ser. II, 4, 49.

An erect herb. Stem 0.9-1.5 m., very stout, simple or branched. Radical leaves 15-30 cm., pinnatisect, oblong-ovate, hispid beneath, segments pinnatifid or lobulate; lower petioled, floral short, very broad, sessile, concave, as long as the flowers, deciduous. Petiole and rhachis hirsute. Whorls 2.5-5 cm. diam., many-flowered, lower distant. Bracts shorter than the calyx, linear-lanceolate, spinescent. Calyx 2 cm., campanulate, stellately pubescent, mouth very shortly 5-lobed, teeth with a dorsal spreading spine 3 mm. long. Corolla 2.5 cm., tube exserted, galea pubescent, fringed with white hairs.

Distribution: W. Punjab, Baluchistan.—Afghanistan.

The plant is poisonous.

Quetta: Bishkhaf—.

Ajuga Linn.

Annual or perennial herbs, often decumbent or stoloniferous. Leaves usually coarsely toothed. Flowers sessile; whorls 2- or more-flowered, axillary or in terminal leafy spikes. Calyx 10- or more-nerved; teeth 5, subequal. Corolla 2-lipped, marcescent, tube often annulate within, throat slightly dilated; upper lip very short, 2-fid; lower spreading; the midlobe usually the largest, emarginate or 2-lobed. Stamens didynamous, the lower pair longer, ascending, exserted or included, anthers 2-celled; cells diverging or divaricate, at length confluent. Disk uniform or swollen behind. Ovary shortly 4-lobed; style 2-fid, the lobes nearly equal. Nutlets 4, obovoid, rugosely reticulate; scar lateral, extending beyond the middle of the nutlet.—Species 30.—Palæotemperate regions.

Bitter tonic, diuretic, vulnerary.

A. chamaepitys Schreb., *A. iva* Schreb., *A. reptans* Linn. are used medicinally in Europe; *A. chamaepitys* Schreb. is also used in the M'Zab; *A. ophrydis* Burch. is used in Basutoland.

1. **Ajuga bracteosa** Wall. ex Benth. in Wall. Pl. As. Rar. I, 59.—Plate 778B.

A perennial herb, softly hairy or glabrate, stolons none; branches many, 10-30 cm. long, usually stout, erect or ascending, simple or

branching, leafy. Leaves 2.5-10 cm. long, ovate, oblanceolate or subspathulate, obtuse, sinuate-toothed, the lower ones petioled. Whorls axillary, often crowded in spikes. Flowers 6-8 mm. long; bracts leaf-like, longer than the whorls, ovate or cuneate-obovate, entire or toothed. Calyx 4 mm. long, villous; teeth half as long as the tube, ovate-lanceolate, acute. Corolla pale blue or lilac, pubescent; tube exserted, nearly as long as the calyx; upper lip erect, lateral lobes of lower lip oblong, midlobe varying in length. Stamens exserted. Nutlets 2.5 mm. long, deeply rugose.

Distribution: W. Himalaya from Kashmir to Nepal up to 7,000 ft., Punjab Plain along the base of the hills, Upper Gangetic Plain.—Afghanistan, China, Japan, Abyssinia.

A bitter astringent given in the treatment of fevers (Baden Powell).

An aromatic tonic, specially useful in ague (Baden Powell).

On the Salt Range, it is used to kill lice, and is regarded as depurative (Stewart).

Jhelum: Kauriboti—; *Kumaon:* Ratpatha—; *Sutlej:* Karku, Nilkantihi—; *Trans-Indus:* Khurbanri—.

Zataria Boiss.

A small shrub, resembling Thymus. Flowers very small in dense, distinct laxly spicate verticillasters. Calyx ovate, membranous, 5-nerved, regular, 5-toothed, bearded at the mouth. Corolla almost included in the tube, limb bilabiate, upper lip slightly shorter, shortly bilobed, lower equally 3-lobed. Stamens 4, didynamous, short, distant, included. Loculi of anthers distinct, parallel, finally divergent. Style shortly bifid. Nutlets ovate, smooth.—Species 1.

1. **Zataria multiflora** Boiss. Diagn. ser. I, 5, 18.

A very small shrub, much-branched. Branches somewhat stiff, slender, puberulous, whitish, passing into an interrupted spike or branching panicle. Leaves very small, petiolate, orbiculate, myrtiform, often punctate, almost glabrous. Cymes globose, dense or all reduced to sessile verticillasters, or the lower ones pedunculate. Bracts

oblong, as long as the calyx or shorter. Calyx membranous, pentagonous, ciliate at the angles, teeth triangular, short. Corolla whitish, slightly longer than the calyx.

Distribution: Baluchistan:—Afghanistan, Persia.

Aromatic, stimulant, diaphoretic (Yunani).

In Jhalawan, the plant is used as a cure for stomachache (Hughes-Buller).

Jhalawan: Izghand—; *Urdu:* Saatar—.

ZIZIPHORA Linn.

Perennial or annual herbs. Calyx narrowly tubular, 13-nerved, very obscurely 2-lipped, upper lip 3-dentate, lower 2-dentate, teeth short, connivent, throat villous. Corolla-tube not annulate, dilated at the throat, upper lip of limb erect, entire, lower patent, 3-fid. Perfect stamens 2, anticous, ascending under the upper lip. Anthers connate at the margin, unilocular or appendiculate with a small stipitate loculus or exappendiculate (even in the same species) Sterile filaments short (the bilocular anthers broken) or none. Style bilobed. Nutlets smooth.—Species 12.—Mediterranean and Central Asia.

1. Much-branched, at the base more or less suffruticose .... 1. *Z. clinopodioides.*
2. An annual herb .... 2. *Z. tenuior.*

The genus exhibits tonic properties.

1. **Ziziphora clinopodioides** M. Bieb. Taur. Cauc. I, 17.

Much-branched, at the base more or less suffruticose. Leaves glabrous, minutely velvety or pilose, ovate-oblong or lanceolate. Floral leaves of the same shape, or slightly broader. Verticillasters united into a terminal ovate-oblong or globose head. Calyx narrowly cylindric, minutely velvety or villous, teeth linear-lanceolate, very short, slightly obtuse, connivent, the upper ones slightly longer. Tube of corolla shortly exserted. Anthers not appendiculate.—A very variable plant.

Distribution: Baluchistan.—Persia, Caucasus, Armenia, Syria.—Songaria, Siberia, Altai.

At Jelga in Baluchistan, the whole of the plant is dried and kept, and a decoction is used to cure typhus fever; also leaves are soaked in water at night and the infusion is drunk in the morning in cases of heat. In the Harboi Hills, the juice is used as a tonic after recovery from fever (Hughes-Buller).

Harboi Hills: Purchink—; *Pushtu:* Maurai—; *Ziarat Hills:* Maurai—.

2. **Ziziphora tenuior** Linn. Sp. Pl. (1753) 31.

An annual herb, canescent, small, branching from the base. Branches erect or ascending. Leaves scabrid, rigidly ciliate, narrowly lanceolate, acute. Floral leaves similar, much exceeding the flowers. Verticillasters axillary often forming along the whole length of the branch either somewhat lax spikes, or dense leafy oblong ones or long-cylindrical ones. Calyx long and thinly cylindrical, hispid, teeth ovate-triangular, obtuse, very short, connivent. Tube of corolla thin, shortly exserted. Anthers appendiculate with a small empty loculus, rarely exappendiculate.

Distribution: Baluchistan.—Afghanistan, Persia, W. Asia, Songaria, Siberia, Altai.

Expectorant, carminative, aphrodisiac; useful in painful uterine complaints; causes hæmaturia (Yunani).

The seeds powdered and mixed with butter milk are used to cure dysentery in Kila Abdulla. They are used as a cure for fevers in Kharan (Hughes-Buller).

Arabic: Mishkatarelmashih—; *Hindubagh:* Maurai—; *Kalat:* Mashnapurchink—; *Kharan:* Kohipurchink—; *Khawas:* Tukhammelanga, Tukhumimalayan—; *Kila Abdulla:* Kahkuti, Tukhammalangai—; *Quetta-Pishin:* Kahkuti—; *Shiriz:* Rang—.

Hymenocrater Fisch. et Mey.

Undershrubs or perennial herbs. Calyx-tube cylindric, 15-nerved, fruiting limb much enlarged, membranous, rotiform, reticulate, deeply 5-lobed. Corolla-tube widened above, upper lip erect, bifid, lower spreading, 3-lobed, midlobe larger, retuse. Stamens 4, didynamous, ascending under the hood, postical ones

longer. Loculi of anthers divaricate. Style subequally bifid at apex. Nutlets ovoid, smooth or tuberculate.—Species 9.—W. Asia.

The genus is therapeutically inert.

1. **Hymenocrater sessilifolius** Benth. in DC. Prodr. XII (1848) 406.

Minutely glandular-pubescent. Stems herbaceous, elongate, at the base branching. Leaves sessile, cordate, ovate, somewhat stiff, acute, subbidentate, upper ones smaller, triangular-lanceolate. Cymes many-flowered, forming 3-5 remote verticillasters, the lower ones shortly pedunculate the rest sessile. Bracts scarious, broadly ovate, acute. Calyx-tube striate, glandular-hirsute, throat villous, fruiting limb scarious, reticulate, purplish, longer than the tube, divided $^2/_3$ down into ovate-oblong, acuminate teeth. Nutlets obscurely punctulate.

Distribution: Baluchistan.—Afghanistan.

In Toba Achakzai, the leaves are left overnight soaking in water and the infusion is given as a morning drink to children (Hughes-Buller).

Baluchistan: Sursanda—.

TEUCRIUM Linn.

Herbs or shrubs. Whorls in 2-6-flowered axillary or terminal spikes racemes or heads. Calyx 10-nerved, teeth 5, equal or the upper larger. Corolla-tube not annulate, limb 1-lipped, the 2 upper and lateral lobes cuneate and very short or obsolete, lower lobe very large. Stamens 4, exserted; anther reniform, cells short, at length confluent. Disk symmetrical. Style-lobes subequal. Nutlets minute, reticulate, smooth or rugulose; hilum large, oblique or lateral.—Species 100.—Cosmopolitan.

1. Leaves small, subsessile, ovate or obovate, cuneate-attenuated, obtuse .... 1. *T. stocksianum.*
2. Leaves small, sessile, oblong, obtuse .... 2. *T. scordium.*

Aromatic, bitter and astringent, diaphoretic and anthelmintic.

The following species are used medicinally in Europe—*T. botrys* Linn., *T. chamædrys* Linn., *T. fruticans* Linn., *T. majorana* Pers., *T. marum* Linn., *T. montanum* Linn., *T. polium* Linn., *T. pyrenaicum* Linn., *T. scordium* Linn., *T. scorodonia* Linn.—; in South Africa—*T. capense* Thunb., *T. riparium* Hochst., *T. africanum* Thunb.—.

OFFICIAL :—The inflorescence of *T. Chamædrys* Linn. and *T. scordium* Linn. in France, of *T. Chamædrys* Linn. (*Chamædrys officinalis* Mœnch. in Portugal.

1. **Teucrium stocksianum** Boiss. Diagn. ser. II, 4, 58.

Subfrutescent at the base, much-branching, appressedly and shortly velvety, young branches erect, fragile, simple or branching. Leaves small, subsessile, ovate or obovate, cuneate-attenuated, obtuse, in the upper part bluntly 7-9-crenate; terminal heads ovate-globose; floral leaves elliptic, entire, exceeding the flowers. Calyx campanulate, pubescent, teeth 4 times shorter than the tube, the lower ones slightly longer, acuminate, the intermediary two ovate, acute, the upper one obtuse, often 3-dentate. Corolla 1½ times as long as the calyx, apparently whitish. Stamens exserted.

Distribution: Baluchistan.

In the Harboi Hills, it is given in cases of pain at the heart. At Kirani, near Quetta, it is used as a cure for fever (Hughes-Buller).

Baluchistan: Kalpora—.

2. **Teucrium scordium** Linn. Sp. Pl. (1753) 565.

A perennial herb, stoloniferous, fœtid and glandular, tomentose or glabrate, leafy. Leaves small sessile, uniform, oblong obtuse, 1.3-3.8 cm., coarsely toothed, base cuneate, whorls 2-6-flowered, axillary. Flowers pedicelled, calyx 3 mm., shortly campanulate, base gibbous, teeth triangular, subequal. Corolla 8 mm., rose-purple. Nutlets oblong, rugose.

Distribution: W. Himalaya, Afghanistan, N. & W. Asia, Europe, N. Africa.

The herb is considered in Europe antiseptic, diaphoretic, and stimulant. An infusion gives excellent results in all inflammatory diseases.

In Spain, the flower tops and the leaves are considered aromatic, bitter, astringent, and are mostly used as diaphoretics and vermifuges.

Catalan: Escordi—; *English:* Water Germander—; *French:* Germandree aquatique, Germandree d'eau, Scordium—; *German:* Batengel, Knoblauch gamander, Lachenknoblauch, Lachinsknopfloch, Læusekraut, Moosknoblauch, Peterskraut, Rosslauch, Schlagkraut, Schorseken, Scordienkraut, Sonnenschiit, Wasserbathengel, Wasser-knoblauch—; *Russian:* Dikiy tchesnok, Scordiya, Zayatchiy tchesnok—; *Spanish:* Escordio oficinal—.

Hyptis Jacq.

Herbs or shrubs with (in our species) small flowers disposed in dense cymose whorls and these in panicled spikes or racemes, cymes sometimes capitate when young. Calyx campanulate, ovate, or tubular, equally 5-toothed, often accrescent in fruit. Corolla with cylindric or somewhat widened or ventricose tube, 2-lobed upper lip, abruptly deflexed saccate lower lip contracted at the base and the side-lobes united either with the lower or upper lip or free. Stamens 4 declinate, anther-cells confluent. Style subentire or 2-fid.—Species 300.—Warm America.

The genus is markedly diaphoretic, carminative, and vulnerary.

The following species are used medicinally in Madagascar—*H. pectinata* Poit., *H. spicigera* Lam.—; in Guiana—*H. verticillata* Jacq.—; in Brazil—*H. canescens* Benth., *H. fasciculata* Benth., *H. fruticosa* Salzm., *H. graveolens* Salzm., *H. pectinata* Poit., *H. spicata* Poit., *H. suaveolens* Poit., *H. umbrosa* Salzm.—.

1. **Hyptis suaveolens** Poit. in Ann. Mus. Par. VII (1806) 472, t. 29, f. 2.

A tall, coarse, branched, very sweet-smelling herb, varying in stature but attaining 1.8-2 m. in congenial situations, with obtusely 4-angled stems often 1.3 cm. diam. Leaves ovate sinuate and crenate-denticulate, lower 11.5 by 9 cm., slightly cordate, hairy, upper smaller not cordate. Flowers small blue, when young often capitate, 2-4 together on an axillary peduncle (in globose heads), or in bracteate axillary recemiform cymes or, in luxuriant specimens,

cymes collected into thyrsiform almost leafless panicles 30 cm. or more long. Filaments hairy. Calyx compressed sub-2-lipped somewhat deflexed, tube 6 mm. long in fruit 10-nerved meeting in a marginal nerve and with an inflexed ring of hairs in the mouth, teeth subulate-aristate strong. Nutlets compressed ovoid oblong, emarginate at tip, pointed below, ribbed, 3 mm. long.

Distribution: Tropical America.—Introduced into tropical Asia.

The plant is pounded and applied to parasitical cutaneous diseases (Campbell).

In Brazil, an infusion is used as a carminative and as a sudorific in catarrhal conditions.

Malay: Malbar hutan, Sapulut, Selasih hutan—; *Tagalog:* Pansipansiyan, Soobcabayo—; *Uriya:* Gangatulsi, Purodo—; *Visayan:* Locoloco—.

PLANTAGINACEAE.

Herbs. Leaves all radical, alternate or opposite, simple, sometimes reduced, often sheathing at the base. Flowers usually hermaphrodite and spicate, actinomorphic. Calyx herbaceous, 4-lobed or parted, sometimes the abaxial sepals more or less united. Corolla gamopetalous, scarious, 3-4-lobed, lobes imbricate. Stamens 4 (rarely 1-2), inserted on the corolla-tube and alternate with the lobes or hypogynous; anthers 2-celled, opening lengthwise; ovary superior, 1-4-celled; style simple; ovules 1 or more in each cell, axile or basal. Fruit a circumscissile capsule or a bony nut. Seeds peltately attached; embryo straight, in the middle of fleshy endosperm, rarely curved.—Genera 3. Species 203.—Cosmopolitan.

The root and the herbaceous parts are generally astringent and slightly bitter; the seeds are often mucilaginous.

The occurrence of a glucoside, aucubin, has been recorded.

OFFICIAL :—*Plantago coronopifolia* Brot. (*P. ceratophylla* Hoffmseg. and Link), *P. lanceolata* Linn. var. *β. irrigua* De Cand.

(*P. altissima Jacq.*) and var. *γ. eriophylla* De Cand. (*P. eriophora* Hoffmseg. and Link or *P. azorica* Hochstetter,), *P. major* Linn. in Portugal.

Plantago Linn.

Scapigerous annual or perennial herbs. Leaves usually radical. Scapes axillary. Flowers small, greenish, spicate, often dimorphic, bracteate. Sepals 4, imbricate in bud, persistent. Corolla scarious, hypogynous; lobes 4, short, imbricate in bud. Stamens 4, inserted on the corolla-tube; filaments filiform, persistent; anthers large, pendulous, versatile. Ovary superior, 1-4-celled; ovules 1-8 in each cell. Capsule 1-4-celled, circumscissilely dehiscent, membranous, 1- or more- seeded. Seed usually attached by the centre; testa thin, mucilaginous; albumen fleshy; embryo cylindric, transverse; radicle inferior.—Species 200.—Cosmopolitan.

A. Leaves all radical		
I. Corolla glabrous. Capsule 2-celled. Cells 4-8-seeded. Seeds angular	1.	*P. major.*
II. Corolla glabrous. Capsule 2-celled. Cells 1-2-seeded		
a. Leaves shortly petioled, lanceolate, entire or toothed, 3-5-ribbed	2.	*P. lanceolata.*
b. Leaves long, very narrowly lanceolate, finely acuminate, 5-nerved	3.	*P. amplexicaulis.*
c. Leaves narrow-linear or filiform, finely acuminate, usually 3-nerved	4.	*P. ovata.*
d. Leaves narrowly linear-lanceolate, 1-nerved, attenuate at base and apex, acute	7.	*P. lagocephala.*
III. Corolla-lobes hirsute. Capsule 2-celled. Cells 1-seeded ..	6.	*P. cilliata.*
B. Stem leafy. Leaves opposite	5.	*P. psyllium.*

Emollient, expectorant, and vulnerary.

The following species are used medicinally in Europe—*P. albicans* Linn., *P. alpina* Linn., *P. billardi* All., *P. coronopus* Linn., *P. cynops* Linn., *P. lagopus* Linn., *P. lanceolata* Linn., *P. major* Linn., *P. maritima* Linn., *P. media* Linn., *P. psyllium* Linn., *P. subulata* Linn.—; in China, Indo China, Malaya, the Philippine Islands—*P. major* Linn.—; in Japan—*P. major* Linn. var. asiatica Dcne.—; in North America—*P. lanceolata* Linn., *P. major* Linn., *P. media* Linn.—; in Guiana—*P. lanceolata* Linn.—; in

La Reunion P. lanceolata Linn., *P. major* Linn.—; in Southern Africa —*P. dregeana* Presl., *P. lanceolata* Linn., *P. major* Linn.—.

OFFICIAL :—The flowered plant of *P. coronopifolia* Brot. (*P. ceratophylla* Hoffmseg. and Link), *P. lanceolata* Linn. var. β-*irrigua* De Cand. (*P. altissima* Jacq.) and var. γ- eriophylla De Cand. (*P. eriophora* Hoffmseg. and Link or *P. azorica* Hochstetter) in Portugal.

1. **Plantago major** Linn. Sp. Pl. (1753) 112.—PLATE 780.

A perennial herb with an erect stout rootstock. Leaves alternate, radical, 2.5-12.5 cm. long, of variable width, ovate or ovate-oblong, obtuse or subacute, entire or toothed, nearly glabrous, base tapering and decurrent into the petiole 3-7- (commonly 5-) nerved; petioles usually longer than the leaf-blade, broad, sheathing at the base. Flowers scattered or crowded in long slender rather lax spikes 5-15 cm. long; bracts 1.5-2 mm. long, shorter than the calyx, broadly ovate-oblong, obtuse, with scarious margins. Calyx 3 mm. long, glabrous; sepals oblong, obtuse or subacute, obtusely keeled on the back and with broad scarious margins. Corolla 4 mm. long, glabrous; lobes lanceolate, acute, reflexed. Capsules ovoid, 3-4 mm. long, glabrous, dehiscing circumscissilely a little above the base, the top coming off as a conical lid tipped with the remains of the style. Seeds 4-8, angled, rugulose, dull black, 0.85 mm. long.

Distribution: Temperate and Alpine Himalaya, Assam, Burma, Baluchistan, Konkan, W. Ghats, Nilgiris, Pulneys, Ceylon.—Malaya, Afghanistan and westwards to the Atlantic. Wild or introduced in these and many other countries.

The plant is useful in rheumatism and griping pain of the bowels.—The leaves and roots are astringent and used in fevers.—The seeds are useful in dysentery (Yunani).

The seeds are considered stimulant, warm, and tonic, and an efficient remedy in dysentery; they are used as a good substitute for those of *P. ovata*.

In Lahoul, the leaves are applied to bruises (Stewart).

In Europe, the leaves are considered cooling, alterative, diuretic. The fresh leaves rubbed on parts of body stung by insects, nettles, etc., will afford relief, and will stay bleeding of minor wounds.

They are used in diarrhœa, piles, etc. In England, country persons apply these leaves to open sores and wounds, or make a poultice of them, or give fomentations with a hot decoction of the same, or prepare a gargle from the decoction when cold. The Greater Plantain possesses a widespread repute in Switzerland as a local remedy for toothache, the root or leaves being applied against the ear of the affected side. In Tuscany, a decoction of the leaves is believed to form an excellent eye wash, and to have styptic properties.

The expressed juice of the plant has proved of curative effect in tubercular consumption with spitting of blood. The root and leaves are still much used against intermittent fevers.

In the Kharan District of Baluchistan, the seed is used for coughs and as a purgative for children.

In China and Indo China, the plant is considered a styptic and vulnerary. The seeds are a remedy for diarrhœa and dysentery; they are pectoral and demulcent and are thought to be favourable to child-bearing.

In Japan, a watery extract of the seed is given for whooping cough.

In the Philippine Islands, the leaves pounded and mixed with butter are a household remedy for gum-boils.

A bunch of leaves made hot and applied to the foot is good to draw out the thorn or splinter (33rd Annual Report of the American Bureau of Ethnology).

The plant is used as a mild astringent in La Reunion.

The plant is much used as a medicine among Europeans and Natives in South Africa. The Zulus squeeze the leaf juice into the mouth and ears, or administer a decoction of the root as an enema to cleanse the intestinal tract of new-born infants. The Xosas drink a similar decoction for diarrhœa. Europeans apply the leaf to tubercular ulcerations. The fresh leaf juice is highly spoken of among them as a remedy for malaria. It is stated that the attacks rapidly cease and often do not recur. The taking of the remedy is said to be followed by much sweating.

In the Transvaal, Europeans plug the ear with the leaf to relieve earache.

Afrikaans: Groot weegbree, Platvoet, Weeblaar, Weegblaar, Weegbree—; *Annam:* Cay phu di, Duong dao, Ma de, Matich, Nguu thiet, Rau ma de, Xa luan the, Xa tien—; *Arabic:* Kasratelazlaa, Lisanelhamal, Sahaatazlaa—; *Bombay:* Barhang, Bartang—; *Cantonese:* Che ts'in—; *Catalan:* Plantatge de fulla ampla, Plantatge de fulla grossa—; *Chinese:* Ch'e Ch'ien—; *Danish:* Vejbred—; *Dutch:* Groote Weggbree—; *English:* Englishman's Foot, Greater Plantain, Plantain Ribgrass, Plantain Ribwort, Ripple Grass, Waybred, Waybroad, Whiteman's Foot—; *Franche Comté:* Rond plantain—; *French:* Grand plantain, Plantain, Plantain commun, Plantain à bouquet, Plantain à larges feuilles, Plantain des oiseaux—; *German:* Aderkraut, Ballenfætsch, Ballenkraut, Dreiadern, Dressig, Fuenfederkraut, Heudieb, Hundauge, Hundrippe, Partenblatt, Rippenkraut, Spierkraut, Spitzfeder, Teufelshuetchen, Vergehkraut, Vœgelbræune, Wegblatt, Wegebreit, Wegeliballen, Wegerich—; *Greek:* Arnoglosson—; *Hindi:* Luhuriya—; *Italian:* Piantaggine maggiore—; *Kalmuk:* Tschur—; *Kashmir:* Gul, Isafghol—; *Kharan:* Baritang—; *Kumaon:* Luhuriya—; *La Reunion:* Gros plantain—; *Malaya:* Chea chean chor—; *Malta:* Greater Plantain, Piantaggine, Cinquenervi, Bizbula—; *Persian:* Barang, Barthang, Kamarsch—; *Philippines:* Llanten—; *Polish:* Babka—; *Portuguese:* Tanchagem mor—; *Punjab:* Ghuzbe, Gul, Isafgol, Karet—; *Pushtu:* Ghuzbhe—; *Roumanian:* Limba oaei, Patlagina—; *Russian:* Popushnik, Poputnik—; *South Africa:* Broad leaf plantain, Plantain, Ribgrass, Ribwort, Ripplegrass, Wild sago—; *Spanish:* Llanten major, Llanten de hoja ancha—; *Swedish:* Groblad—; *Tagalog:* Lantin—; *Urdu:* Barhang, Bartang—; *Zulu:* inDlebekatekwane—.

2. **Plantago lanceolata** Linn. Sp. Pl. (1753) 113.—Plate 781A.

Leaves lanceolate, 7.5-20 by 2-2.5 cm., 3-5-ribbed, nearly or quite entire, tapering downwards in a short stalk. Scapes 30-45 cm., deeply furrowed. Spikes ovoid or shortly cylindric, 2.5-3.8 cm. long. Two lower sepals usually united. Stamens far protruding. Capsule containing 2-4 oblong seeds.

Distribution: W. Himalaya, from Kashmir to Simla, Salt Range, Waziristan, 5,000—8,000 ft., Ceylon (introduced).—Europe and N. Asia.

The leaves are used as an application to wounds, inflamed surfaces and sores. The seeds are used with sugar as a drastic purgative.

In Europe, the leaves are considered astringent, and useful for healing sores when applied thereto, and for dressing wounds. The powdered root is of use for curing vernal ague.

In Guiana, the leaves enter into the confection of a collyrium.

In South Africa, small pieces of the root are introduced into the external auditory meatus for the relief of earache.

In the Transvaal, the plant is used in the same way as *P. major*, and is stated to have the same properties.

Afrikaans: Smal weegbree, Weegblaar—; *Bengal:* Baltung, Bartung—; *Catalan:* Plantatge de fulla estreta—; *English:* Cocks and Hens, Fighting Cocks, Hardheads, Ribgrass, Ribwort, Ripple Grass, Soldiers—; *French:* Bonnes femmes, Herbe au charpentier, Herbe à cinq coutures, Herbe à cinq côtes, Lancelée, Lancéole, Lancéolée, Oreille de lièvre, Petit plantain, Plantain étroit, Plantain lancéolé, Plantain long, Plantain rond, Tête noire—; *French Guiana:* Plantain—; *German:* Aderkraut, Ballenfætsch, Ballenkraut, Dreiaderb, Dreissig, Fuenfaderkraut, Heudieb, Hundauge, Hundrippe, Partenblatt, Rippenkraut, Spierkraut, Spitzfeder, Spitzwegerich, Spitzwegram, Teufelshuetchen, Vergehkraut, Vœgelbræune, Wegblatt, Wegebreit, Wegeliballen, Wegerich—; *Hindi:* Baltanga—; *Italian:* Lanciuola, Mestolaccio, Piantaggine lunga—; *Languedoc:* Linguo de can—; *La Reunion:* Petit plantain—; *Malta:* Ribgrass Plantain, Arnoglossa, Lanciuola, Mestolaccio, Bizbula salvagga—; *Pushtu:* Bartang, Parbarpangi, Parharpangi—; *Roumanian:* Limba oæi—; *Russian:* Podorojnik lantsetolistnye—; *South Africa:* Lamb's tongue, Ribgrass, Ribwort, Wild Sago—; *Spanish:* Llanten de hoja estrecha, Llanten menor—; *Sussex:* Lamb's Tongue—.

3. **Plantago amplexicaulis** Cav. Icon. II (1793) 22, t. 125. —PLATE 781C.

Annual or perennial, more or less hairy, stemless or with a short stem, often branched above. Leaves 7.5-15 by 1.3 cm., narrowly lanceolate, acuminate, 5-nerved, narrowed and sheathing at

the base, entire or very distantly toothed. Scapes numerous, axillary, terete, glabrous, usually exceeding the leaves. Flowers in ovoid spikes 1.3-3.8 cm. long; bracts 5 mm. long, cucullate, broadly ovate-oblong, obtuse, membranous except the green midrib. Calyx 4-5 mm. long; sepals ovate-oblong, subacute, all membranous except the midrib which in the inner sepals is very narrow, sometimes almost 0. Corolla glabrous; tube 3 mm. long; lobes 3 by 1.5 mm., ovate, acute, concave. Capsules 5 mm. long, 2-seeded, ovoid, subobtuse, pale brown, smooth, the top coming off as a conical lid. Seeds 4 mm. long, oblong, boat-shaped, nearly black.

Distribution: Punjab plains, Malwa, Sind, Baluchistan.—Westwards to Egypt and Greece.

The properties are the same as those of *P. ovata* (Yunani).

The plant is considered astringent, useful in intermittent fever, highly valuable in pulmonary affections. It is applied to the eyes in ophthalmia.

In Baluchistan, the juice is drunk in the hot weather as a cooling drink (Hughes-Buller).

The herb enters into the composition of snake remedies and is believed to be an antidote to snake-venom (Ainslie); but it is useless in the antidotal treatment of snake-bite (Mhaskar and Caius).

Nushki: Danich—; *Punjab:* Gajpipali, Isafghol, Spighwol—; *Urdu:* Ispaghul—.

4. **Plantago ovata** Forsk. Fl. Aegypt-Arab. (1775) 31.—Plate 782A.

A stemless or nearly stemless softly hairy or woolly annual. Leaves 7.5-23 cm. long, scarcely reaching 6 mm. broad, narrowly linear or filiform, finely acuminate, entire or distantly toothed, attenuated at the base, usually 3-nerved. Scapes longer or shorter than the leaves, glabrous or pubescent. Flowers in ovoid or cylindric spikes 1.3-3.8 cm. long; bracts 4 mm. long and about as broad as long, broadly ovate or suborbicular, concave, membranous except the narrow midrib, glabrous. Calyx 3 mm. long, usually glabrous; sepals elliptic, obtuse, concave, scarious except the midrib which is as broad (or nearly so) in the inner as in the outer sepals.

Corolla-lobes rounded, 3 mm. long, concave, obtuse, apiculate, glabrous. Capsules 8 mm. long, ellipsoid, obtuse, the upper half coming off as a blunt conical lid, membranous, glabrous. Seeds 3 mm. long, ovoid-oblong, boat-shaped, smooth, yellowish brown.

Distribution: Punjab plains and low hills from the Sutlej westwards, Sind, Baluchistan.—Westwards to Spain and the Canary Islands.

The seeds are sweet, acrid, mucilaginous, astringent to the bowels, tonic; useful in "kapha", biliousness, dysentery and leprosy; cause flatulence (Ayurveda).

The seeds are cooling, demulcent; useful in inflammatory and bilious derangements of the digestive organs; applied as poultice to rheumatic and gouty swellings; good in dysentery and irritation of the intestinal tract; decoction useful in cough and chronic diarrhœa (Yunani).

Demulcent, and mildly astringent. The seeds have been found serviceable in febrile, catarrhal, and renal affections, but their chief use is in diarrhœa and dysentery. Moistened with water, they form a good emollient poultice.

The seeds yield to water a good deal of mucilage, and form a cooling demulcent drink which is prescribed in cases where emollients are required. A slight degree of astringency and some tonic property may be imparted to the seeds by application of a moderate degree of heat, and it is said that this remedy cures the chronic diarrhœa of European and native children on the failure of other medicines.

The crushed seeds made into a poultice with vinegar and oil are applied to rheumatic and gouty swellings. With the mucilage a cooling lotion for the head is made. Two to three drachms moistened with hot water and mixed with sugar are given in dysentery and irritation of the intestinal canal to produce an easy stool. The decoction is prescribed in cough. The roasted seeds have an astringent effect, and are useful in irritation of the bowels in children and in dysentery.

Isphagul seeds have demulcent and diuretic properties and are generally used in inflammatory conditions of the mucous membrane

of gastro-intestinal and genito-urinary tracts. They are generally given in the water of tender cocoanuts. The seeds were given in the form of an infusion in cases of specific urethritis and found to relieve considerably the burning and irritation accompanying the disease (Koman).

The seeds of *P. ovata* are very beneficial in chronic dysenteries of amœbic and bacillary origin and chronic diarrhœa due to irritative conditions of the gastro-intestinal tract. A glucoside named *aucubin* has been found in the seeds, but it is physiologically inactive. The tannins which are present in appreciable quantities have little action on the entamœba or bacteria. The action of the drug would therefore appear to be purely mechanical, being due to the large amount of mucilage which is contained in the superficial layers of the seeds. This mucilage is shown not to be acted on by the digestive enzymes, and therefore passes through the small intestine unchanged. It lines the mucous membrane of this part of the gut and its demulcent properties give it a protective and sedative action. In the large gut the intestinal bacteria have been shown to have little or no action on the mucilage. Practically the whole of it is passed out unchanged during the 12 to 24 hours following its administration. During its passage through the gut it coats the inflamed and ulcerated mucosa and protects it from being irritated by the fluids and gases, the products of gastro-intestinal and bacterial digestion. This enables the lesions to heal quickly. The toxins present in the gut are further absorbed by the gel and their absorption into the system is prevented. The seeds are taken in large quantities and as they swell up in contact with water they increase the bulk of the intestinal contents and in this way relieve chronic constipation by mechanically stimulating the intestinal peristalsis. The mucilage of *P. ovata* seeds acts in very much the same way as liquid paraffin. It is very much cheaper and is further free from the injurious effects produced by the habitual use of the latter drug, *e.g.*, malignant diseases of the colon, eczema ani, paraffin pains, etc., (R. N. Chopra; *Ind. Med. Gazette,* August 1930).

Arabic: Bazrekatima, Bazrequatuna—; *Bengal:* Eshopgol, Isabgul, Ispaghul—; *Bombay:* Isapghol—; *Canarese:* Isabakolu,

Isabgolu, Isamgolu—; *Deccan:* Isapghol, Ispoghul—; *Gujerati:* Isafghol, Isapghol, Urthamujiru—; *Hindi:* Isabghul, Isbaghol, Ispaghul, Issufgul—; *Kashmir:* Ismogul—; *Kharan:* Khardanichk, Khardanik—; *Malayalam:* Karkatasringi—; *Marathi:* Isabagola—; *North-Western Provinces:* Ispaghul—; *Persian:* Isabghul, Isbaghol, Ispaghol, Isparzah, Ispoghul, Shikamdarida—; *Punjab:* Bartang, Isabghol, Isafghol, Ispaghol—; *Pushtu:* Isafgol, Ishpagul—; *Sanskrit:* Ishadgola, Shlakshnajira, Snigdhabija, Snigdhajiraka—; *Shiraz:* Bangust, Shikamdaridah—; *Sind:* Ispungur—; *Tamil:* Ishappukol, Iskol, Ispoghol—; *Telugu:* Isapagala, Isphagula—; *Urdu:* Ispaghul—; *Uriya:* Isabgul—; *Zhob:* Isphgul, Sangpara, Shkampara—.

5. **Plantago psyllium** Linn. Sp. Pl. (1753) 167.—PLATE 782B.

Scapigerous herbs, annual, erect, strict, glandular-pubescent. Stem leafy, 10-20 cm. Leaves opposite, linear or linear-lanceolate, flat, obtuse, 2.5-6.3 cm., with fascicles in their axils, hence appearing whorled, margin entire, with a very few glandular tubercles, bases ciliate. Peduncles in the upper axils, scapes usually shorter than the leaves. Spikes ovoid, 8-13 mm.; bracts acute, lower elongate, hispid. Sepals oblong, subacute. Corolla very small.

Distribution: N.-W. Punjab.—Westwards to Greece and Egypt.

The small seeds are an easy and popular aperient in Southern Europe. In France, given in a dessertspoonful dose, they are widely prescribed as a laxative in lieu of mineral aperient waters. They act after being soaked for some hours in cold water, by their mucilage, and when swallowed, by virtue of a laxative oil set free within the intestines. These seeds are dispensed by the London druggists who supply French medicines.

Catalan: Herba de las pussas, Herba pussera, Silli—; *English:* Clammy Plantain, Fleawort—; *French:* Herbe à la puce, Herbe aux puces—; *Italian:* Pulicaria—; *Malta:* Fleawort, Psillio, Pulicaria, Zerrighet-il-brieghet—; *Spanish:* Zaragatona comun—.

6. **Plantago ciliata** Desf. Fl. Atlant. I (1798) 137, t. 39.

Annual or perennial, often dwarf, stemless or very shortly caulescent, densely silky or woolly. Leaves 2.5-10 cm. by 5-8 mm., usually oblanceolate, mucronate, densely silky or villous, entire or slightly and irregularly toothed, base tapering into a long or short petiole which is often obscure owing to the decurrence of the leaf-blade. Scapes stout, numerous, softly woolly, shorter or longer than the leaves. Flowers in ovoid or cylindric spikes 1.3-4.5 cm. long; bracts 4-5 mm. long, ovate-oblong, obtuse, hairy and ciliate with long slender hairs, membranous except the green midrib. Calyx 4 mm. long; sepals oblong-obovate, membranous, with a green midrib (that of the inner sepals very narrow), hairy on the back with long slender hairs. Corolla-tube 4 mm. long, glabrous; lobes 2.5 mm. long, ovate-lanceolate, acuminate, finely pointed, silky-hairy on the back. Capsules subglobose, 3 mm. long, 2-seeded, the top coming off as a subhemispherical lid. Seeds 2.5 mm. long, broadly ovoid, boat-shaped, with membranous margins, smooth.

Distribution: Punjab hills, Sind, Baluchistan.—Westwards to Arabia and Egypt.

In Fort Sandeman, the plant is used as a cure for dysentery (Hughes-Buller).

Fort Sandeman: Isabghol—.

7. **Plantago lagocephala** Bunge in Mem. Sav. Etr. Petersb. VII (1851) 445.

An annual herb, stemless, small, softly pilose. Leaves narrowly linear-lanceolate, 1-nerved, at the base and apex attenuate, acute. Scapes thin, arcuate, terete, slightly shorter than the leaves. Spikes ovate-oblong, very villous. Bracts as long as the calyx, villous, ovate, long-acuminate, keeled, narrowly membranous. Calyx-teeth outside very villous, on the margin membranous, unequal, two semiovate and unequal-sided, two alternate with the others linear-oblong, slightly acute. Corolla-tube very glabrous, teeth ovate acute, outside very hirsute. Capsules oblong 2-seeded; seeds boat-shaped, granular.

Distribution: Baluchistan.—Turkestan.

Various preparations are used against gripes, constipation, white urine, and boils (Hotson).

Baluchistan: Danishk—; *Brahui:* Pidarri—; *Urdu:* Isufgol—.

NYCTAGINACEAE.

Herbs, shrubs or trees. Leaves usually opposite, entire; stipules 0. Flowers hermaphrodite (rerely unisexual), regular, sometimes dimorphous; inflorescence various; bracts often involucrate, free or connate. Perianth monosepalous, usually small, petaloid; tube persistent, enveloping the fruit; limb 3-5-lobed, persistent or deciduous, the lobes plicate in bud. Stamens 1-30, hypogynous, sometimes unilateral; filaments small, unequal, inflexed in bud; anthers included or exserted, dorsifixed, didymous. Ovary 1-celled, free; ovule solitary, basal, erect; style filiform, involute in bud; stigma small, simple or multifid. Fruit membranous, indehiscent, enclosed in the coriaceous perianth-tube. Seed erect; testa adherent; albumen soft or floury; embryo straight with convolute cotyledons or incurved; radicle inferior.—Genera 20. Species 160.—Mostly tropical and especially America.

A. Flowers diœcious, unisexual
   Shrubs with opposite or alternate leaves and greenish cymose flowers .... PISONIA.
B. Flowers bisexual. Embryo hooked. Herbs
   1. Flowers showy, 1-3 in a calyx-like involucre .... MIRABILIS.
   2. Flowers small or minute in heads or umbels.
      Bracts minute .... BOERHAVIA.

The Order exhibits emetic and cathartic properties.

BOERHAVIA Vaill. ex Linn.

Erect or diffuse often divaricately branched herbs. Leaves opposite, often in unequal pairs. Flowers small, paniculate, umbellate or subcapitate, articulated with the pedicel; bracteoles small, often deciduous, rarely whorled and involucrate. Perianth-tube long or short, ovoid below, narrowed above the ovary; limb funnel-shaped

with 5-lobed margin, the lobes plicate. Stamens 1 or 2-5, connate below, exserted; filaments capillary, unequal. Ovary oblique, stipitate; ovule erect; stigma peltate. Fruit enclosed in the ovoid, turbinate or clavate, obtuse or truncate perianth-tube, round, 5-ribbed or 5-angled, viscidly glandular. Seeds with adherent testa; embryo hooked; cotyledons thin, broad, the outer the larger; enclosing a soft scanty albumen.—Species 40.—Cosmopolitan.

The root has cathartic, febrifuge, and antisyphilitic properties.

The following species are used medicinally in Arabia—*B. diffusa* Linn.—; in the Gold Coast—*B. diffusa* Linn., *B. repens* Linn.—; in West Indies—*B. diffusa* Linn., *B. paniculata* Rich.—; in Guiana—*B. decumbens* Vahl, *B. diffusa* Linn., *B. paniculata* Rich., *B. repens* Linn.—; in Brazil—*B. repens* Linn.—; in Peru—*B. scandens* Linn., *B. tuberosa* Lam.—.

1. **Boerhavia diffusa** Linn. Sp. Pl. (1753) 3.—*B. procumbens* Roxb. Fl. Ind. I (1832) 146; Wight Ic. t. 874.—Plate 783A & B (under *B. repens* Linn.).

Herbaceous, diffuse; root large, fusiform; stems prostrate or ascending, reaching 0.6-0.9 m. long, divaricately branched, slender, cylindric, thickened at the nodes, minutely pubescent or nearly glabrous, often purplish. Leaves at each node in unequal pairs, the larger 2.5-3.8 cm., the smaller 1.3-2 cm. long, both nearly as broad as long, broadly ovate or suborbicular, rounded at the apex, green and glabrous above, usually white with minute scales beneath, the margins entire, often coloured pink, somewhat undulate, base rounded or subcordate; petioles nearly as long as the blade, slender. Flowers very small, shortly stalked or nearly sessile, 4-10 together, in small umbels arranged in slender long-stalked corymbose, axillary and terminal panicles; bracteoles small, lanceolate, acute. Perianth 3 mm. long; ovarial part of tube 1.25 mm. long, contracted above the ovary, glandular-viscid; limb funnel-shaped, dark pink, with 5 narrow vertical bands outside. Stamens 2 or 3, slightly exserted. Fruit 3 mm. long, clavate, rounded, broadly and bluntly 5-ribbed, very glandular.

Distribution: Throughout India, Baluchistan, Ceylon.—Tropical and subtropical Asia, Africa and America.

1. *Red variety* :—Bitter; cooling, astringent to the bowels; useful in biliousness, blood impurities, leucorrhæa, Anæmia, inflammations; causes " vata ".—2. *Dark variety* :—Bitter, pungent; heating, alterative; useful in heart diseases, anæmia, inflammations, asthma, " vata " and " kapha ".—The leaves are useful in dyspepsia, tumours, enlargement of the spleen, abdominal pains (Ayurveda).

The leaves have a sharp taste; appetiser, alexiteric; used in ophthalmia and for eye wounds; useful in pain of the joints.—The seeds are tonic, expectorant, carminative; useful in muscular pain, lumbago, scabies, scorpion-sting; purify the blood; hasten delivery (Yunani).

The root is well-known for its diuretic properties. It is also a very good expectorant. Taken in large doses it acts as an emetic.

It is used in jaundice, ascites, anasarca, scanty urine, and internal inflammations. Mixed with dried ginger it is given in urticaria.

In the Punjab, the drug is considered useful for the eyes. In Bombay, it is used for dropsical swellings. In Goa, the herb is esteemed as a diuretic in gonorrhœa.

In the West Indies, the herb is a popular remedy for gonorrhœa.

The plant in combination with other drugs is prescribed for snake-bite (Charaka, Sushruta, Vagbhata) and scorpion-sting (Sushruta). The root ground in rice water is given internally for snake-bite (Rasaratnakara, Yogaratnakara); alone or in combination with the root of either *Gossypium herbaceum* or *Glycyrrhiza glabra* it is administered internally and externally for scorpion-sting (Yogaratnakara, Nighantaratnakara, Brihannighantaratnakara). No part of the plant is an antidote to either snake-venom (Mhaskar and Caius) or scorpion-venom (Caius and Mhaskar).

Vaidyans consider the root of this plant to possess laxative, diuretic and stomachic properties. The powdered root either alone or combined with oxide of iron was given in several cases of anasarca, the result of Bright's diseases or anæmia; the drug acted as a diuretic in every case and the patients derived much benefit from its use. . . . This drug is considered to be a sovereign remedy for dropsy. To verify what has been stated in my previous report, this

drug was administered in the form of a liquid extract in cases of chronic Bright's disease with general dropsy. It was found to be a good diuretic, the dropsy diminishing gradually with the increase in the flow of urine (Koman).

1. The active principle is a body of alkaloidal nature which we have called *punarnavine*. There are also large quantities of potassium nitrate and other potassium salts present in this plant.—2. Intravenous injections of the alkaloid in cats produce a distinct and persistent rise of blood pressure and a marked diuresis.—3. The diuresis is mainly due to the action of the alkaloid on the renal epithelium, although the rise in blood-pressure may contribute towards it.—4. Clinically 1 to 4 drachms of the liquid extract from either the dry or the fresh plant produce diuresis in cases of oedema and ascites, especially due to early liver, peritoneal and kidney conditions. When the liquid extract is used the presence of a large amount of potassium salts no doubt reinforces the action of the alkaloid.—5. The drug appears to exert a much more powerful effect on certain types of cases of ascites, *i.e.*, those due to early cirrhosis of the lever and chronic peritonitis (Hale White) than some of the other diuretics known (Chopra, Ghosh, Ghosh, and De; *Ind. Med. Gazette*, May 1923).

Arabic: Handakuki, Sabaka—; *Bengal:* Gadhapurna, Punarnaba, Svetapunarnaba—; *Bombay:* Ghetuli, Khapara, Punarnava—; *Canarese:* Kommegida—; *Ceylon:* Karicharanai—; *Cutch:* Punarnuwa—; *Deccan:* Thikrikajhar—; *English:* Hogweed, Pigweed—; *Gujerati:* Dholisaturdi, Motosatodo, Vakhakaparo—; *Hausa:* Babbajibji, Babbajugi, Sarikinjibji, Sarikinjugi—; *Hindi:* Sant, Thikri—; *Kharan:* Wallakah—; *La Reunion:* Bécabar bâtard—; *Malayalam:* Thazhuthama—; *Marathi:* Kharaparya, Pandharighentuti, Raktavasu, Vasu—; *Mundari:* Kecoara—; *Nasirabad:* Wasao—; *Persian:* Devasapat—; *Sanskrit:* Bhauma, Kathillaka, Krishnakhya, Krura, Lohita, Mandalpatrika, Nava, Navya, Nila, Nilapunarnava, Nilavarshabhu, Nilini, Pravrishayani, Pravrishenya, Punarbhava, Punarnava, Raktakanda, Raktapatrika, Raktapunarnava, Raktapushpa, Raktapushpika, Raktavarshabhu, Sarini, Shilatika, Shonapatra, Shophaghni, Shothaghni, Shyma, Vaishakhi, Varshabhava, Varshabhu,

Varshaketu, Vikaswara, Vishaghni, Vishakarpara—; *Sind:* Nakbel—; *Sinhalese:* Jantops, Petasudupala—; *Tagalog:* Paanbalivis—; *Tamil:* Mukaratte, Mukurattai—; *Telugu:* Atikamamidi, Punarnava—; *Urdu:* Bashkhira—; *West Indies:* Ipeca, Tassole glouteronne velue, Valériane patagonelle, Bejuco de purgacion—.

Pisonia Plum. ex Linn.

Trees or shrubs unarmed or with axillary spines. Leaves opposite or alternate, entire. Flowers small, usually dioecious, in paniculate subsessile or pedunculate cymes; bracteoles 2-3, not involucrate. Male flowers : Perianth campanulate; limb 5-lobed or 5-toothed, the segments induplicate-valvate. Stamens 6-10, exserted; filaments connate below into a tube or ring; anthers oblong or didymous. Female flowers : Perianth tubular, usually enlarged at the base. Ovary elongate, ovoid, sessile; ovule solitary; style included or exserted; stigma capitellate, peltate or lacerate. Fruit cylindric, compressed, or 5-angled, with 5 viscid ribs or with rows of viscid stipitate glands; utricle elongate, membranous. Seed with a hyaline testa adnate to the pericarp; embryo straight; albumen scanty, soft; radicle inferior.—Species 50.—Tropics.

1. A large scandent shrub with many curved axillary sharp stout spines .... 1. *P. aculeata.*
2. A large branched unarmed shrub .... 2. *P. morindaefolia.*

The genus is therapeutically inert.

1. **Pisonia aculeata** Linn. Sp. Pl. (1753) 1026.—Plate 784.

A large scandent shrub with many curved axillary nearly opposite sharp stout spines; trunk reaching 15 cm. diam.; branches numerous, subopposite, terete, slightly striate, finely pubescent or nearly glabrous. Leaves 2.5-7.5 by 1.3-3.8 cm., elliptic or elliptic-lanceolate, obtuse, entire, glabrous or nearly so, base tapering; petioles 6-20 mm. long. Flowers in small dense cymose pubescent clusters, combined into small pedunculate axillary panicles; bracts and bracteoles scarcely 1.25 mm. long, ovate-oblong, obtuse, hairy; pedicels short, pubescent, the fruiting pedicels much elongated.

Male flowers : Perianth campanulate, 2.5 mm. long, pubescent outside, and with 5 deep triangular acute teeth. Stamens 6-10, much exserted. Female flowers : Perianth tubular, 2.5 mm. long, shortly 5-toothed; style rather stout; stigma lacerate. Fruit oblong or clavate, with long pedicels, 5-ribbed, pubescent between the ribs, each rib muricate with 1 or 2 vertical rows of stalked viscous glands.

Distribution: Coast forests of Burma, Andaman Islands, W. Peninsula, N. Circars, Ganjam to Godavari.

The bark and the leaves are used as a counter-irritant for swellings and rheumatic pains. The juice mixed with pepper and other ingredients is given to children suffering from pulmonary complaints.

Bengal: Baghachura—; *Bulacan:* Panacla—; *Canarese:* Ettarumullinaballi—; *Fanti:* Akoborweraiw—; *Ilocano:* Puriquet—; *Lambadi:* Voltekhatero—; *Tagalog:* Digquitdigquit, Pacataro—; *Tamil:* Karindu, Murukkalli, Muruvilikkodi, Turattumul, Udappu—; *Telugu:* Embudi, Konkaraputri, Konki, Pisangi—; *Twi:* Akoborweraiw—; *Uriya:* Batoryni, Hationkuso—.

2. **Pisonia morindæfolia** R. Br. in Wall. Cat. (1828) 7130.—P. alba Spanog. in Linnæa XV (1841) 342.—Plate 785 (under *P. alba*).

An evergreen tree, all parts glabrous or the young shoots minutely puberulous. Leaves ovate-oblong to oblong, 15-25 cm. long, usually unequal and obtuse at the base, on a 1.3-3.3 cm. long petiole, shortly acuminate to acute and blunt, thick-membranous, glabrous or minutely puberulous in the axils of the nerves. Flowers dioecious, in peduncled rather large puberulous cymes; perianth about 3 mm. long, funnel-shaped, greyish puberulous. Fruits in squarrose stiff puberulous or glabrous panicles, similar to those of the former, linear-club-shaped, about 1.3 cm. long, truncate, 5-cornered, the corners with a single row of sharp and a little recurved acute prickles.

Distribution: Andamans, cultivated in India and Ceylon.—Malay Islands.

The fresh leaves, moistened with Eau-de-Cologne, are used to subdue inflammation of an elephantoid nature in the legs and other parts.

Bombay: Chinaisalit—; *Tamil:* Ilachaikkettayilai, Muruval—.

Mirabilis Linn.

Herbs often with tuberous roots and medium sized or somewhat large flowers clustered on the branches of large leafy panicles, each or clusters of 2-10 surrounded by a calyx-like involucre of 4-5 connate bracts. Perianth brightly coloured, salver-shaped to campanulate. Stamens 3-5, rarely 6, somewhat exserted. Nut ellipsoid or obpyramidal, often ribbed or rugose. Cotyledons large suborbicular on germination.—Species 25.—Tropical America.

M. jalapa Linn. is used medicinally in the Philippine Islands, La Reunion, Guiana; *M. dichotoma* Linn. in Brazil; *M. dichotoma* Linn. and *M. longiflora* Linn. in Tropical America.

1. **Mirabilis jalapa** Linn. Sp. Pl. (1753) 177.

A well-known herbaceous plant 30-75 cm. high with large perennial tuberous roots, rather fleshy stems and cordate leaves. Flowers usually purple but very numerous colours are found and the perianth is sometimes variegated. There is only one flower to the involucre in this species, which latter therefore is apt to be mistaken for a calyx.

Distribution: Tropical America.

The leaves have a sharp taste; maturant; lessen inflammations.—The root is aphrodisiac; good for syphilitic sores (Yunani).

The root is used as a purgative in La Reunion and the Philippine Islands. The leaves are applied to boils, phlegmons and whitlow, as a maturant.

Afrikaans: Vieruurbom—; *Arabic:* Shahelleilli, Zahrulajl—; *Bengal:* Gulabas, Krishnakeli, Krishnokeli—; *Bombay:* Gubhaji, Gulabbas—; *Burma:* Mizubin, Myœzu—; *Canarese:* Chandramallige, Gulamaji, Madhyanhamallige, Sanjamallige, Sanjimallige—; *Catalan:* Diego de noche, Don Diego de noche, Don Juan de noche, Juan de noche—; *Chinese:* Tche Kia Hoa—; *Deccan:* Gulabash—; *English:* Four o'clock Flower, Marvel of Peru—; *Fanti:* Guaamboroba, Sankani—; *French:* Belle de nuit, Fleur admirable, Herbe triste,

Faux jalap, Jasmin rouge, Merveille du Perou, Nyctage, Nyctage faux jalap—; *French Guiana:* Belle de nuit, Herbe de quatre heures—; *Ga:* Dmaidzi edzwai forfori—; *Hindi:* Gulabbas, Gulabash, Guleaabbas—; *Hova:* Vanimpolera, Voampolera, Vonimpolera—; *La Reunion:* Belle de nuit—; *Madras:* Andimalligai—; *Malayalam:* Antimalari, Antimantaram—; *Marathi:* Gulbas—; *North-Western Provinces:* Gulbansa—; *Persian:* Guleabbas, Guliaabbas—; *Philippines*: Diego de noche, Maravillas, Oracion, Suspiros—; *Punjab:* Abasi, Gulabbas—; *Sanskrit:* Krishnakeli, Sandhyakali—; *Sind:* Abhasie—; *Sinhalese:* Sendrikka, Sindrikagaha—; *Spanish:* Don Diego de noche, Don Juan de noche, Maravilla de noche, Trompetilla—; *Tagalog:* Gilalas, Guilalas—; *Tamil:* Antinarulu, Pattarachi, Pattarashu—; *Telugu:* Batharachi, Bhadrakshi, Chandrakanta, Chandramalli—; *Twi:* Nnonnannhwiran—; *Urdu:* Guleabbas—.

AMARANTHACEAE.

Herbs (rarely shrubs), erect or with climbing branches. Leaves opposite or alternate; stipules 0. Flowers usually hermaphrodite (rarely polygamous or dioecious), small, usually in terminal simple or paniculate spikes, cymes or clusters (the outer flowers of a cluster sometimes deformed); bracts hyaline or scarious, never leafy; bracteoles 2, scarious. Perianth usually of 5 free or slightly connate hyaline or scarious persistent sepals, imbricate in bud. Stamens 1-5, opposite the sepals usually included; filaments usually connate below or united with intervening membranous staminodes in a hypogynous cup; anthers 1- or 2- celled. Ovary 1-celled, ovoid, ellipsoid or globose; ovules 1 or more, amphitropous, erect, or suspended from short or long free basal funicles; style sometimes simple or obsolete with capitellate or small stigma, sometimes 2-3-fid with acute stigmas; or styles 2 or 3 papillosely stigmatic on the lower face, erect or recurved. Fruit a membranous utricle, rarely a circumscissilely or irregularly rupturing capsule, very rarely a berry, enclosed in or

supported by the persistent perianth. Seed inverted or erect, orbicular, ovate or reniform, compressed; testa crustaceous; embryo horseshoe-shaped or annular, surrounding a floury albumen—Genera 72.—Species 700.—Tropical and temperate regions.

A. Leaves alternate. Anthers 2-celled. Ovary 2- ∞-ovuled. Herbs .... CELOSIA.
B. Anthers 2-celled. Ovary 1-ovuled
 1. Flowers spicate, bisexual. Nut crustaceous .... DIGERA.
 2. Flowers unisexual .... AMARANTHUS.
 3. Sepals hyaline, woolly. Staminodes short. Flowers all perfect .... AERVA.
 4. Sepals spinescent. Flowers all perfect .... ACHYRANTHES.
C. Anthers 1-celled. Ovary 1-ovuled. Ovules suspended from a basal funicle. Staminal tube very short. Stigma subsessile, capitate .... ALTERNANTHERA.

In general, they are mucilaginous, emollient, and refrigerant; less commonly astringent, diuretic, and sudorific; rarely tonic and stimulant.

CELOSIA Linn.

Herbs usually annual. Leaves alternate. Flowers hermaphrodite, in dense terminal and axillary spikes, sessile or shortly pedicellate, white or coloured; bracts scarious; bracteoles 2, scarious. Perianth of 5 segments slightly connate below, scarious, oblong or lanceolate, acute or obtuse, striate, erect in fruit. Stamens 5; filaments connate below in a membranous hypogynous cup; anthers 2-celled; staminodes 0. Ovary 1-celled, ovoid or subglobose; ovules 2 or more, on long funicles; style 0 or short or long, sometimes elongating in fruit; stigmas simple or 2 or 3, subulate. Fruit a circumscissilely dehiscent capsule membranous or sometimes corky or coriaceous. Seeds 2 or more, erect, lenticular; testa crustaceous, black, shining or dull; embryo annular, surrounding floury albumen; cotyledons linear; radicle descending or ascending.—Species 35.—Tropical and temperate regions.

Diuretic, antidysenteric, antiscorbutic and refrigerant; useful in disorders of the blood.

The following species are used medicinally in China and Malaya—*C. argentea* Linn., *C. cristata* Linn.—; in Annam—*C. cristata* Linn.—; in Abyssinia and Erythrea—*C. anthelmintica* Aschers, *C. trigyna* Linn.—; in the Gold Coast and Nigeria—*C. trigyna* Linn.—; in the West Indies—*C. paniculata* Linn.—.

1. **Celosia argentea** Linn. Sp. Pl. (1753) 205; Wight Ic. t. 1767.—Plate 786.

Annual, 0.3-0.9 m. high, glabrous; stem erect, simple or ascending; branches grooved. Leaves variable, 2.5-10 by 0.6-3.2 cm., linear or linear-lanceolate (rarely ovate), acute, entire, glabrous, base much tapering into a short petiole or leaves sessile. Flowers at first pinkish, afterwards glistening white, crowded and imbricate, in close cylindric blunt or acuminate terminal spikes 2.5-15 by 2-2.5 cm., sometimes branching at the apex in a cock's comb form; bracteoles 4-5 mm. long, linear-lanceolate, scarious. Perianth 8 mm. long or more; sepals linear-lanceolate, acute scarious, with 3 close parallel slender striae on the back. Stamens short; filaments connate into a cup. Style filiform, elongate after flowering, sometimes exserted in fruit. Capsules 3-4 mm. long, ellipsoid, tapering at the apex into the style, circumscissile about the middle. Seeds 4-8, subreniform, compressed, 1.5 mm. diam., black, polished, shining.

Distribution: Throughout India, Ceylon.—Tropical Asia, Africa, and America, cultivated or introduced.

The plant has heating properties; the seeds are useful in diarrhœa (Ayurveda).

The seeds are bitter; aphrodisiac, vulnerary; useful in diarrhœa, blood diseases, mouth sores. The leaves are antipyretic, aphrodisiac; reduce inflammations, strengthen the liver; useful in gonorrhœa; burnt leaves are styptic (Yunani).

The seeds are an efficacious remedy in diarrhœa. They are also taken as an aphrodisiac.

The dried plant is considered antiscorbutic and cooling in China. The seeds have a reputation of clearing the vision and healing diseases of the eye.

Arabic: Baratanaki—; *Bengal:* Swetmurga—; *Bombay:* Kudhu, Kurdu—; *Cantonese:* Ts'ing Seung—; *Chinese:* Ch'ing Hsiang—; *Gold Coast:* NKyewoduai, Shokotor, Torbor—; *Gujerati:* Lambadi, Lapadi—; *Hausa:* Farinalayafu—; *Hindi:* Debkoti, Sufaidmurgha, Sarwari, Survari—; *Konkani:* Kurduqui bagi, Kurdu—; *Malaya:* Ching seong—; *Marathi:* Kurada, Kurdu—; *North-Western Provinces:* Ghogiya, Sarwali, Sirali—; *Porebunder:* Lampadi—; *Punjab:* Chilchil, Salgara, Sarpankha, Sarwali, Sil—; *Sanskrit:* Vitunna—; *Santal:* Sirgitarak—; *Sind:* Surwali, Uchakukur—; *Sinhalese:* Kirihenda, Kirrihanda—; *Tagalog:* Cadayohan, Quindayohan—; *Telugu:* Gurugu, Panchechettu—; *Urdu:* Sarwali—; *Visayan:* Cudiapa—.

2. **Celosia argentea** var. **cristata** Haines Bot. Bih. & Or. 759.—*C. cristata* Linn. Sp. Pl. (1753) 205.—PLATE 787 (under *C. cristata*).

Leaves often broad, sometimes up to 23 by 5 cm. Flowers smaller than in the type. Spikes very often excessively developed and monstrous as in the well-known garden 'Cock's Comb,' which gives also yellow flowers.

Distribution: Grown in gardens and found as an escape.

The plant is acrid and sour; cooling, alexiteric; useful in "kapha", biliousness, dysentery, strangury, diseases of children snake-bite; facilitates delivery (Ayurveda).

The flowers are considered astringent, they are used in cases of diarrhœa, and in excessive menstrual discharges.

The seeds are demulcent and useful in painful micturition, cough and dysentery.

In China, the seeds are employed in disorders of the blood as hæmorrhage and menorrhagia, and for making emollient lotions for ophthalmia.

The plant is not an antidote to snake-poison (Mhaskar and Caius).

Annam: Thanh tuong tu—; *Bengal:* Huldimurga, Lalmurga—; *Burma:* Kyetmonk—; *Chinese:* Chi Kuan—; *English:* Cock's Comb—; *Gujerati:* Morashikha—; *Hindi:* Kokan, Lalmurghka, Morashikha,

Pilamurghka—; *Kashmir:* Mawal—; *Malaya:* Kai kwan—; *Marathi:* Mayurshikha—; *Mexico:* Moco de pavo—; *Mundari:* Daliara, Kokorecobaha, Simdaliara—; *Philippines:* Palonpalongan—; *Sanskrit:* Barhichuda, Kekishikha, Madhuchhada, Mayurashikha, Mayurchuda, Nilakanthashikha, Sahasrahi, Shikha, Shikhalu, Shikhibala, Shikhini, Sushikha—; *Spanish:* Borlas, Borlones, Crestas de gallo—; *Telugu:* Ettakodiyuttatotakuru, Kodijuttutotakura—; *Urdu:* Alsana, Asnana—; *Visayan:* Padongpadongan—.

DIGERA Forsk.

Annual herbs with angular branches. Leaves alternate, entire, petiolate. Flowers in axillary pedunculate spikes, ternate, the 2 outer reduced to crested scales, the central perfect; bracts and bracteoles persistent. Perianth-segments 5, slightly connate below, oblong, erect, the 2 outer larger. Stamens 5, hypogynous; filaments free, filiform; anthers 2-celled; staminodes 0. Ovary 1-celled, truncate; ovule solitary, erect; style filiform; stigmas 2, recurved. Fruit a subglobose compressed crustaceous nut included in the perianth. Seed erect, globose; testa thin, adhering to the albumen; embryo annular; cotyledons linear; radicle descending.—Species 1. —Palæotropics.

1. **Digera arvensis** Forsk. Fl. Aeg.-Arab. (1775) 65.—*Desmochæta muricata* DC.; Wight Ic. t. 732.

An annual herb (becoming perennial), 30-60 cm. high; branches glabrous, spreading. Leaves 2-7.5 by 1.3-4.5 cm., variable, thin, ovate or elliptic, acute or rounded at the apex, sometimes with reddish margins, glabrous; petioles 1.3-2.5 cm. long. Flowers sessile, in threes in lax axillary pedunculate spikes 2.5-12.5 cm. long; bracts and bracteoles 2.5 mm. long, ovate-lanceolate, acute, submembranous, persistent. Perianth 4 mm. long, rose-coloured; sepals ovate-oblong, acute. Stigmas 2, recurved. Fruit 2.5-3 mm. diam., globose, somewhat compressed, margined, muriculate. Seed yellowish brown.

Distribution: Bengal, N. W. Provinces, Mt. Abu, W. Peninsula, Ceylon, Baluchistan. —Afghanistan, Arabia, N. Africa.

The herb is sweetish, acrid; cooling; astringent to the bowels at first and then laxative in large doses; useful in "kapha", biliousness, "tridosha".—The flowers and seeds are given for urinary discharges (Ayurveda).

Bengal: Gungatiya, Luta, mahawria—; *Bijnor:* Das—; *Bombay:* Getan—; *Ceylon:* Toggil—; *Gujerati:* Kanajaro—; *Hindi:* Latmahuria, Lisava—; *Loralai:* Danawul shinbutæ, Shinbuti—; *Marathi:* Gitana—; *Porebunder:* Kanaje, Kanjo—; *Punjab:* Leswa, Tandala, Tartara—; *Sanskrit:* Aranyavastuka, Kunanjara, Kuranjara, Manjarika—; *Santali:* Kari gandhari—; *Sind:* Tandala—; *Telugu:* Chanchali Kura, Chenchalikura—; *Windar:* Lulur—.

AMARANTHUS Linn.

Annuals. Leaves alternate. Flowers small, monoecious or polygamous, in axillary clusters or dense terminal and axillary spikes or panicles; bracteoles 2. Male flowers : Perianth of 5 (rarely 1-3) membranous equal or subequal ovate-lanceolate segments. Stamens 5 (rarely 1-3); filaments free, subulate or filiform; anthers 2-celled; staminodes 0. Female flowers : Perianth-segments oblong or spathulate, erect in fruit. Ovary ovoid, compressed, 1-celled; ovule solitary, subsessile, erect; styles 1-3 or 0. Fruit an orbicular or ovoid compressed utricle, or a circumscissile membranous or coriaceous capsule. Seed erect, orbicular, compressed; testa crustaceous; embryo annular, enclosing floury albumen; cotyledons linear; radicle inferior.—Species 60.—Tropical and temperate.

A. Stamens 5. Sepals 5
  I. Leaf-axils with spines .... 1. *A. spinosus.*
  II. Leaf-axils not spinous .... 2. *A. paniculatus.*
B. Stamens 3. Sepals 3
  I. Fruit circumscissile
    Stem branching near the middle, yielding only one crop annually .... 3. *A. gangeticus.*
  II. Fruit indehiscent
    a. A low much-branched herb .... 4. *A. viridis.*
    b. A tall succulent herb .... 5. *A. blitum.*

The genus exhibits emollient and anthelmintic properties.

The following species are used medicinally in Europe—*A. blitum* Linn., *A. retroflexus* Linn., *A. viridis* Linn.—; in China—*A. mangostanus* Linn.—; in Annam—*A. oleraceus* Linn., *A. tristis* Linn.—; in the Philippine Islands—*A. spinosus* Linn.—; in Colombia—*A. celosioides* H. B. & K.—; in Brazil—*A. bahiensis* Mart., *A. gangeticus* Wall., *A. viridis* Linn.—; in Guiana—*A. brasiliensis* Moq., *A. oleraceus* Linn.—; in Cambodia and Madagascar—*A. hypochondriacus* Linn., *A. spinosus* Linn.—; in La Reunion—*A. spinosus* Linn.—; in Guinea—*A. spinosus* Linn.—; in the Gold Coast—*A. caudatus* Linn., *A. spinosus* Linn.—.

1. **Amaranthus spinosus** Linn. Sp. Pl. (1753) 991; Wight Ic. t. 513.—PLATE 788.

An erect glabrous herb 30-60 cm. high; stems hard, often reddish, with many grooved branches and with sharp divaricate spines, often exceeding 1.3 cm. long, in the leaf-axils. Leaves 3.2-7.5 by 1.3-3.8 cm., ovate or lanceolate, obtuse, spinous-apiculate, entire, glabrous above, sometimes scurfy beneath; main nerves numerous, slender, conspicuous below; petioles 2-6.3 cm. long. Flowers very numerous, sessile, in dense axillary clusters and in terminal and axillary dense or interrupted spikes; bracteoles linear, bristle-pointed, usually longer than the sepals. Perianth of male flowers 2.5-3 mm. long; sepals 5, ovate, acute, bristle-pointed. Perianth of female flowers scarcely 1.5 mm. long; sepals 5, oblong, obtuse, apiculate. Stamens 5. Capsule 1.5 mm. long, ovoid, thickened at the top, circumscissile about the middle, membranous, rugose; styles 2, divaricate, pubescent.

Distribution: Throughout India, Ceylon.—Many tropical countries.

The plant is cooling; digestible, alexiteric, laxative, diuretic, stomachic, antipyretic; improves the appetite; useful in "kapha" and biliousness, blood diseases, burning sensation, hallucination, leprosy, bronchitis, rat-bite, piles, leucorrhœa. The root is heating, expectorant; lessens the menstrual flow; useful in leucorrhœa and leprosy (Ayurveda).

The root is considered a specific in gonorrhœa. It is used in menorrhagia and eczema; and as a poultice it is applied to bubœs

and abscesses for hastening suppuration. It is also considered a lactagogue and a specific for colic.

The boiled leaves and roots are given to children as a laxative; they are applied as an emollient poultice to abscesses, boils, and burns.

The whole plant is used in the treatment of snake-bite; but no part of it is an antidote to snake-venom (Mhaskar and Caius).

In Cambodia, the root is used internally as a diuretic, sudorific, and febrifuge.

In the Gold Coast, it is used as an enema for stomach trouble and the Krobos use it for curing piles.

In Madagascar, the root is considered diuretic, laxative, and galactagogue. The decoction is given for retention of urine and gonorrhœa. The root ground in water is applied to eczematous skin. The ash of the plant is applied topically to fungating chancre.

In La Reunion, the herb is used as a refrigerant and diuretic. For blennorrhagia the root is chewed and its decoction is drunk.

Adangme: Anagomio—; *Akim:* Nantroinkase—; *Ashanti:* Asantewa—; *Bengal:* Kantamaris, Kantanate, Kantanutia—; *Betsileo:* Kimoælahy—; *Burma:* Hinkanœsuba, Hinnœsuba—; *Cambodia:* Phti ach mon, Phti banla—; *Canarese:* Mulladantu, Mullaravesoppu, Mulluharivesoppu—; *English:* Prickly Amaranth—; *Ewe:* Matongui, Sainutsonhe—; *French:* Amaranthe e'pineuse, Blette e'pineuse, Brède malabare, Epinard épineux—; *Ga:* Srahangmei—; *Gujerati:* Kantalodambho, Kantalodhimdo, Kantanudant, Tanjalja—; *Hindi:* Cholai, Kantenatia—; *Hova:* Anampatsa, Anampatsy—; *Ilocano:* Cuanton—; *Konkani:* Dentto—; *Krepi:* Sainutsonhe—; *La Reunion:* Pariétaire piquante—; *Malay:* Bayam duri—; *Malayalam:* Mullanchira—; *Malinke:* Boron—; *Marathi:* Chanalai, Kantebhaji, Kantemat, Kanterimat, Tandulja—; *Mundari:* Janumleperara—; *Pampangan:* Ayantoto—; *Philippines:* Bamban, Bledo, Quilite—; *Sakalave:* Sabotraboay—; *Sanskrit:* Alpamarisha, Bahuvirya, Bhandira, Ghanasvana, Granthila, Kandakamarisha, Kandera, Meghanada, Pathyashaka, Sphurjathu, Sushaka, Svanitavhaya, Tandula,

Tandulanama, Tanduleraka, Tandulibija, Tanduliya, Vira, Vishaghna—; *Santal:* Janumarak—; *Sinhalese:* Katutampala—; *Tagalog:* Orayi, Quilitis—; *Tamil:* Mullukkirai—; *Telugu:* Ettamulugoranta, Mundlatotakura, Nalladoggali—; *Twi:* Asibe, Esibe, Nantwibin, Saharankaseai, Saharansœ—; *Visayan:* Bayangbayang, Calites, Culetes, Harum, Orayi, Tilites, Tilitis—; *Zulu:* imBuya—.

2. **Amaranthus paniculatus** Linn. Sp. Pl. ed 2 (1763) 1406.—*A. frumentaceus* Ham. in Roxb. Fl. Ind. III (1832) 609; Wight Ic. t. 720.—PLATE 789.

A tall handsome plant 1.2-1.8 m. high or more; stem stout, grooved and striate, glabrous or slightly pubescent. Leaves 5-15 by 2.5-7.5 cm., elliptic-lanceolate, acute or acuminate, base cuneate; main nerves numerous, slender, prominent beneath; petioles 2.5-10 cm. long. Flowers numerous, in dense thyrsoid gold coloured or red spikes, the central spikes the longest; bracteoles 3-5 mm. long, acicular, exceeding the sepals. Perianth 2.5-3 mm. long; sepals 5, oblong-lanceolate, acute, shortly awned. Stamens 5. Capsules 3 mm. long, ovoid, narrowed at the tip, circumscissile about the middle; styles 3, short. Seeds 1.25-1.5 mm. diam., subglobose, white, red or black.

Distribution: Cultivated or as an escape in E. and W. Asia and Africa.

The leaves and seeds are laxative, soporific, narcotic; improve the appetite; useful in biliousness; cause "kapha" (Ayurveda).

The plant is used for purifying the blood and in piles; also as a diuretic in strangury. It is given in scrofula and applied topically to scrofulous sores.

Arabic: Hamaham—; Bengal: Bathu, Chuko—; *Bombay:* Kaholabhaji—; *Deccan:* Rajgira—; *Gujerati:* Rajgaro—; *Hindi:* Chuamarsa, Ganhar, Kalgaghasa—; *Kashmir:* Bustanafroz—; *Marathi:* Rajagira—; *Persian:* Angoza, Bustanafroz, Tajekhurus—; *Peshawar:* Tajekhurus—; *Sanskrit:* Rahadri, Rajagiri, Rajashakini—; *Zulu:* imBuya—.

3. **Amaranthus gangeticus** Linn. Syst. Nat. ed. 10 (1759) 1268.—*A. oleraceus* Willd. Sp. Pl. IV (1805) 386 (non Linn.); Wight Ic. t. 715.—*A. melancholicus* Linn. Sp. Pl. 989.—PLATE 790.

An erect herb 0.6-1.2 m. high; stem stout, branching above the middle, often tinged with purple, grooved and striate, glabrous or nearly so. Leaves variable, 5-15 by 2.5-10 cm., rhomboid-ovate or lanceolate or deltoid-ovate, obtuse, finely apiculate, often notched at the tip, glabrous, base long-tapering, decurrent on the petiole; main nerves numerous, prominent beneath; petioles 2.5-7.5 cm. long. Flowers clustered in the axils and forming a long terminal more or less interrupted spike; bracteoles 3 mm. long, narrowly lanceolate-subulate, with a slender awn, membranous. Perianth 4 mm. long; sepals 3, lanceolate, with a long capillary awn, membranous. Stamens 3. Capsules 2.5 mm. long, ovoid, suddenly narrowed at the apex, circumscissile about the middle, rugose, membranous; styles 3, distinct. Seed 1.5 mm. diam., lenticular, smooth and shining, black.

Distribution: Throughout India, Ceylon.—Tropical Asia, Africa and America.

The leaves are sweetish; expectorant, vulnerary, antipyretic, emmenagogue, emetic; stop suppuration; useful in biliousness, fleshy tumours, toothache, burning sensations, liver complaints, inflammations; decoction a good gargle in stomatitis (Yunani).

The plant is astringent, and highly recommended in menorrhagia, diarrhœa, dysentery, and hæmorrhages from the bowels.

Externally it is used as an emollient poultice, as an application in ulcerated conditions of throat and mouth, as a wash for ulcers and sores.

Arabic: Asiulraee—; *Bengal:* Banspatanatiya—; *Bombay:* Matichulai—; *Ceylon:* Arikirai, Chirukirai—; *English:* Love-lies-bleeding, Red Cocks-comb—; *Gujerati:* Adbaudambho—; *Hindi:* Lalnatiya, Rajkiri—; *La Reunion:* Pariétaire noire—; *Madras:* Kirai—; *Malay:* Bayam merah—; *Marathi:* Ranmat—; *Merwara:* Chulaisag, Labra, Lalsag—; *Mundari:* Araleperara, Gandarileperara, Nagurileperara—; *Persian:* Kishtah—; *Sanskrit:* Marisha—; *Sinhalese:* Sudutampala—; *Tagalog:* Halon—; *Uraon:* Gandhariara—; *Urdu:* Lalsag—.

3A. Var. **tristis** Prain Beng. Pl. 869.—*Amaranthus tristis* Willd. Sp. Pl. IV (1805) 385; Wight Ic. t. 713.—*A. polygamus* Willd. 1. c. 384 (non Linn.); Wight Ic. t. 714.

Erect, very ramous near the ground. Leaves rhomboid-oval, emarginate. Clusters axillary and in terminal spikes. Sepals subulate ending in an awled joint, longer than the utricle.

Distribution: Cultivated as a pot plant.

The roots are considered demulcent.

The herb is used as a diuretic in form of decoction in combination with some other medicines.

In Annam, the whole herb is used as an ascaricide.

The seeds are useless in the antidotal treatment of snake-bite (Mhaskar and Caius).

Annam: Hien thai, Rau gien—; *Bengal:* Champanatiya, Lalchampanatiya—; *Betsileo:* Kimoævavy—; *Deccan:* Churikibhaji—; *Hindi:* Chowlaikabhaji, Chumlisag—; *Hova:* Anantarika—; *La Reunion:* Pariétaire rouge—; *Las Bela:* Maleru—; *Sakalave:* Anambario—; *Sanskrit:* Ganna, Mekanada, Tanduliya—; *Santali:* Pondgandhari—; *Tamil:* Kappikkirri, Kuruvikkirai, Shirukirai, Sirrukirai—; *Telugu:* Doggalikura, Koyyatotakura, Sirrukura—.

4. **Amaranthus viridis** Linn. Sp. Pl. (1763) 1405.

An erect much-branched glabrous herb 30-60 cm. high; branches grooved, glabrous, often purplish. Leaves 2.5-7.5 by 1.3-5 cm., ovate or deltoid-ovate, obtuse, usually notched at the apex, glabrous, base truncate or cuneate; petioles 1.3-5 cm. long. Flowers shortly pedicellate, pale green, in small axillary clusters and in slender tapering terminal and axillary paniculate spikes-like racemes; bracteoles ovate-oblong, acute, with a green keel, shorter than the sepals. Sepals 3, ovate-oblong, 1.2-1.5 mm. long, membranous, with a strong green keel. Utricle 1.7 mm. long, indehiscent, suborbicular, compressed, pointed, rugose; styles 2 or 3, short. Seed 1 mm. diam., lenticular, smooth, shining, black.

Distribution: All tropical countries.

The properties are the same as those of *A. spinosus* (Ayurveda).

In Brazil, the leaves are used as an emollient.

The herb is held in high repute as a remedy for snake-bite (Charaka, Sushruta, Vagbhata, Yogaratnakara, Vaidyavinoda, Rasaratnakara, Nighantaratnakara, Brihannighantaratnakara, Ayurvedaprakasha, Roberts), but no part of the plant is an antidote to snake-venom (Mhaskar and Caius).

The leaves either alone (Subodhavaidyaka) or in combination with the root of *Cardiospermum halicacabum* (Vagbhata) are administered internally for scorpion-sting, but they are not an antidote to scorpion-venom (Caius and Mhaskar).

Catalan: Bled vert—; *Gujerati:* Dhimdo—; *Malay:* Bayam munyit, Bayam putih—; *Marathi:* Lhanamat—; *Sanskrit:* Tanduliya, Vishaghna—; *Sinhalese:* Kuratampala—; *Spanish:* Bledo verde—; *Tagalog:* Culilis, Halom—; *Visayan:* Halom—.

5. **Amaranthus blitum** Linn. Sp. Pl. (1753) 990.

A glabrous procumbent annual. Leaves small, long-petioled, oblong ovate or rounded, usually 2-lobed at the apex; base acute. Flowers in axillary clusters. Sepals 3, shorter than the utricle, linear-oblong or lanceolate, obtuse and apiculate or acute. Stamens 3. Utricle orbicular or broadly ovate, membranous, usually indehiscent.

Distribution: A common weed throughout India and Ceylon extending to many other countries in temperate and tropical regions. Much used as a pot-herb in India.

In Spain, the plant is considered cooling, emollient, and mildly astringent.

Catalan: Blet—; *English:* Trailing Amaranth—; *French:* Amaranthe blitte, Brède malabare, Fleur de jalousie, Passe velours—; *Gujerati:* Adbautangaligo, Ukdibhaja, Varsadanibhaja—; *Hindi:* Sadanatiya, Vannatiya—; *La Reunion:* Pariétaire blanche—; *Marathi:* Rantandurja—; *Nasirabad:* Mariro—; *Sanskrit:* Alpamarisha—; *Sibi:* Mariro—; *Spanish:* Bledo—.

5A. Var. **oleracea** Hook. f. Fl. Brit. Ind. IV (1885) 721.—*Amaranthus oleraceus* Linn. Sp. Pl. ed. 2 (1763) 1403.

A tall erect glabrous succulent herb. Stem stout, grooved and striate. Leaves 3.8-6.3 cm. long, ovate-oblong or rounded, usually

notched at the apex; base cuneate; nerves prominent beneath; petioles 2.5-6.3 cm. long. Flowers in axillary clusters and in terminal simple or branched spikes; bracteoles shorter than sepals. Sepals 3, linear-oblong, obtuse or acute. Stamens 3. Utricle 2.5 mm. long, broadly ovate and with a blunt apex; styles 3, very short. Seeds lenticular, dark-brown and shining.

Distribution: Cultivated in India and Ceylon and elsewhere in warm regions.

The herb is sweet and cooling; stomachic; useful in biliousness, hæmorrhagic diathesis, "tridosha"; causes constipation (Ayurveda).

In Annam, the whole plant is considered a good remedy for the roundworm.

In Guiana, the leaves are used as an emollient enema; they are also pounded and applied to blisters.

Annam: Hien thai, Rau gien—; *Bengal:* Natiyasag, Sadanatia—; *Chinese:* Hong Han Ts'ai—; *Deccan:* Dantkebhaji, Dat—; *French:* Epinard marron—; *French Guiana:* Ergon—; *Gujerati:* Dambho, Dant—; *Hindi:* Marasa, Vavada—; *Marathi:* Bhaji, Dant, Matha, Pokala, Tambadamath—; *Sanskrit:* Bashpaka, Marisha, Marsha—; *Tamil:* Kiraitand, Tandkirai—; *Telugu:* Erratotakura, Peddatotakura, Tellatotakura, Totakura—.

AERVA Forsk.

Herbs or undershrubs, erect, prostrate or climbing. Leaves alternate, or opposite, or fascicled. Flowers hermaphrodite or polygamous, in simple or panicled spikes; bracts and 2 bracteoles small. Perianth 5- (rarely 4-) lobed; sepals equal or the outer broader, all or only the 3 inner woolly. Stamens 5 (rarely 4); filaments connate, with short or long intervening staminodes, in a short hypogynous cup; anthers 2-celled. Ovary ovoid or subglobose, 1-celled; ovule solitary, pendulous from a long basal funicle; style simple, short or long; stigma capitellate, or stigmas 2. Fruit a membranous utricle or circumscissile capsule with coriaceous crown. Seeds inverse; testa coriaceous; embryo annular, surrounding floury albumen; cotyledons linear; radicle superior.—Species 12.—Tropical Asia and Africa.

1. Sepals 5. Spikes axillary and terminal
   Erect. Leaves alternate. Flowers unisexual, diœcious .. 1. *A. tomentosa.*
2. Sepals 5. Spikes all axillary
   Leaves alternate. Flowers unisexual and bisexual .... 2. *A. lanata.*

Mucilaginous and resolvent.

1. **Aerva tomentosa** Forsk. Fl. Aegypt.-Arab. (1775) CXXII et. 170.—*A. javanica* Juss. in Ann. Mus. Par. II (1803) 131; Wight Ic. t. 876.—Plate 791 (under *A. javanica*).

Suffruticose, hoary-tomentose, 0.6-0.9 m. high; stem terete, branched, as thick as a goose-quill, covered with a thick, easily detachable stellate tomentum. Leaves alternate, variable, 2.5-6.3 cm. by 3-16 mm., sessile or nearly so, linear-oblong or oblong-spathulate, obtuse and slightly retuse, or acute, densely tomentose. Flowers unisexual, usually dioecious, dull white, sessile in linear or oblong spikes 2.5-15 cm. long arranged in naked terminal panicles; bracteoles broadly ovate, acute, white, hyaline. Male flowers : Perianth rather more than 1.5 mm. long; sepals elliptic-oblong, subobtuse, woolly at the back. Rudimentary ovary ovoid, acute, usually shortly stipitate with a short style and minutely bifid stigma. Female flowers : Perianth 2.5 mm. long; sepals oblong, subacute, apiculate; style about 0.5 mm. long; stigmas 2, as long as the style. Utricle orbicular--ovoid, very thin. Seed 0.85 mm. diam., lenticular, shining, brown-black.

Distribution: Punjab, Central India, Burma, Baluchistan, Sind, Gujarat, Khandesh, Deccan, Carnatic, Ceylon.—Arabia, Egypt, tropical Africa, Cape Verde Islands.

At Saruna in Jhalawan, a decoction of the plant is used to remove swellings (Hughes-Buller).

Jhalawan: Bal—; *Kharan:* Balishto—; *Kotiro:* Buh—; *Las Bela:* Boh, Buh—; *Saruna:* Bal—; *Tamil:* Perumbulai, Pulaippu—; *Telugu:* Magabira, Peddapindikonda, Pindikonda—; *Tigré:* Gen-nafer—; *Tigrinia:* Leg'a demu—.

2. **Aerva lanata** Juss. in Ann. Mus. Par. II (1803) 131.—*A. floribunda* Wight Ic. t. 1776 bis, fig. A.—Plate 792.

Erect or prostrate with a long tap-root, branched from near the base; branches many, terete, pubescent or woolly-tomentose, striate.

Leaves alternate, 2-2.5 by 1-1.6 cm. on the main stem, 6-10 by 5-6 mm. on the branches, elliptic or obovate, or suborbicular, obtuse or acute, entire, pubescent above more or less white with cottony hairs beneath; petioles 3-6 mm. long, often obscure. Flowers greenish white, very small, sessile, often bisexual, in small dense subsessile axillary heads or spikes 6-13 mm. long, often closely crowded and forming globose clusters; bracteoles 1.25 mm. long, membranous, broadly ovate, concave, apiculate. Perianth 1.5-1.25 mm. long; sepals oblong, obtuse, sometimes apiculate, silky-hairy on the back. Utricle broadly ovoid, acute; stigmas 2. Seed 0.85 mm. diam., smooth and polished, black.

Distribution: Throughout India, Ceylon.—Arabia, tropical Africa, Java, Philippines.

The plant is diuretic; used in lithiasis.—The root is demulcent, diuretic; useful in strangury (Ayurveda).

The roots are used in the treatment of headache.

The plant is regarded as a demulcent on the Malabar Coast. It is valued for cough in Ceylon; also as a vermifuge for children.

Ashanti: Bameha—; *Bengal:* Chaya—; *Deccan:* Khul, Kul—; *Gujerati:* Bur, Kapurimadhuri—; *Hindi:* Gorkhabundi, Kapurijadi—; *Marathi:* Kapurmadhura, Kapurimadhuri, Kapurphuti, Kumrapindi—; *Mundari:* Cauliara, Lupuara—; *Porebunder:* Bhonyajdi, Gorkhaganjo—; *Punjab:* Buikallan—; *Rajputana:* Bhui—; *Sadani:* Caursag—; *Sanskrit:* Astmabayda—; *Sind:* Bui, Jari—; *Sinhalese:* Polkudupala—; *Spanish:* Sanguinaria de Cuba—; *Tamil:* Sirupulai—; *Telugu:* Pindikumda—; *Trans-Indus:* Azmei, Sassai, Spirke—.

ACHYRANTHES Linn.

Herbs. Leaves opposite, petiolate, entire. Flowers hermaphrodite, in slender simple or panicled spikes, soon deflexed; bracts and bracteoles spinescent. Perianth of 4-5 rigid lanceolate-subulate aristate shining segments, ultimately becoming hardened and ribbed. Stamens 2-5; filaments filiform, subulate, connate at the membranous base, with as many quadrate staminodes which are toothed or with a toothed scale on the back: anthers 2-celled. Ovary oblong,

subcompressed, 1-celled; ovule solitary, pendulous from a long basal funicle; style filiform; stigma capitellate. Fruit an oblong or ovoid utricle. Seed inverse, oblong; testa coriaceous; embryo annular, surrounding floury albumen; cotyledons linear or lanceolate; radicle erect.—Species 15.—Tropics and subtropics.

1. Leaves orbicular, obovate or elliptic .... 1. *A. aspera.*
2. Leaves from elliptic to linear-lanceolate, acuminate .... 2. *A. bidentata.*

Diuretic and astringent.

A. bidentata Blume. is used medicinally in China and Malaya; *A. aspera* Linn. in the Philippine Islands, Madagascar, La Reunion, Mauritius, and Southern Africa; *A. argentea* Lam. in the West Indies.

1. **Achyranthes aspera** Linn. Sp. Pl. (1753) 204.—Plate 793.

Erect, 0.3-0.9 m. high; stem stiff, not much branched; branches terete or obsoletely quadrangular, striate, pubescent. Leaves few, usually thick, 3.8-6.3 by 2.5-4.5 cm., elliptic or obovate, sometimes nearly orbicular, usually rounded (rarely subacute) at the apex, finely and softly pubescent on both sides, entire; petioles 6-20 mm. long. Flowers greenish white, numerous, stiffly deflexed against the woolly-pubescent rhachis, in elongate terminal spikes which are at first short but soon lengthen, reaching as much as 50 cm. long in fruit; bracts 3 mm. long, broadly ovate, acuminate, membranous, aristate, persistent; bracteoles 3 mm. long, broadly ovate, concave, with a spine as long as the blade, hard in fruit, falling off with the fruiting perianth. Perianth 4-6 mm. long, glabrous and shining; sepals subequal, ovate-oblong, finely pointed, with narrow white membranous margins. Stamens 5; staminodes truncate, fimbriate. Utricle oblong-cylindric, truncate at the apex, thinly membranous, enclosed in the hardened perianth, smooth, brown, rather more than 2.5 mm. long. Seed subcylindric, truncate at the apex, rounded at the base, brown.

Distribution: Throughout India, Baluchistan, Ceylon.—Tropical Asia, Africa, Australia, America.

1. *White Variety* :—Bitter, pungent; heating, laxative, stomachic, carminative; improves appetite; useful in vomiting, bronchitis,

"vata", heart diseases, piles, itching, pain in the abdomen, ascites, dyspepsia, dysentery, diseases of the blood.—The seeds are useful in piles.—2. *Red Variety* :—pungent; cooling, emetic, constipating, alexipharmic; useful in ulcers, "vata" and "kapha", scabies, abdominal troubles, dyspepsia, dysentery; removes worms from the head.—The seeds have flavour; cooling, emetic, expectorant; useful in leprosy; constipating (Ayurveda).

The plant possesses valuable medicinal properties as a pungent and laxative, and is considered useful in dropsy, piles, boils, eruptions of the skin, etc. The dried plant is given to children for colic, and also as an astringent in gonorrhœa. Water in which the crushed plant has been boiled is given in pneumonia.

In Sind, it is used by foresters as an application to wounds caused by Babool thorns.

In Las Bela, the plant is used as a cure for coughs and rheumatism (Hughes-Buller).

The infusion of the root is given as a mild astringent.

The seeds and leaves are considered emetic, and are useful in hydrophobia. The juice of the leaves is taken for dysentery in Ceylon.

The flowering spike made into pills with a little sugar is a popular preventive medicine in Behar for persons bitten by rabid dogs.

The ash yields a large quantity of potash; it is used in cases of asthma and cough. Mixed with orpiment the ash is used externally in the treatment of ulcers, and of warts on the penis and other parts of the body.

Sesamum oil and the ash (Apamarga taila) are used in the treatment of disease of the ear, being poured into the meatus.

In Mauritius and La Reunion, the herb is commonly used as a depurative, astringent, diuretic, and pectoral. In Madagascar, the root is given in puerperal, pulmonary, syphilitic, and rheumatismal troubles. It is used also in ophthalmia, dropsy, and cutaneous diseases.

In South Africa, the Zulus use an infusion of the roots as an emetic for pains in the chest not due to cough. The Kwenas and Chuanas inhale the steam from boiling the plant, and also use it in a hot bath for acute chills. The treatment causes sweating.

Every part of the plant is recommended in the treatment of snake-bite (Charaka, Sushruta, Vagbhata, Yogaratnakara, Roberts), and scorpion-sting (Charaka, Sushruta, Subodhavaidyaka), but no part has been found effective in the antidotal and symptomatic treatment of either snake-bite (Mhaskar and Caius) or scorpion-sting (Caius and Mhaskar).

Afrikaans: Klits—; *Annam:* Nguu tat—; *Antsianaka:* Fandrangozaza—; *Arabic:* Atkumah—; *Assam:* Apang—; *Bengal:* Apang—; *Betsileo:* Tsipotemena—; *Bombay:* Aghada—; *Burma:* Kivalamon, Kunelamon—; *Canarese:* Utranigida, Uttrane—; *Chinese:* Nieou Si—; *Chuana:* Moxato—; *English:* Prickly Chaff-flower—; *French:* Cadelari—; *Gujerati:* Agheda, Aghedi—; *Hasada:* Sitirkad—; *Hausa:* Hakorinmachiji, Kaiminkadangare—; *Hindi:* Apang, Chichra, Chirchira, Chirchitta, Latjira—; *Hova:* Tsipolomanitra, Tsiporomanitra, Vatofosa, Vatofosalahy—; *Konkani:* Kantmogro—; *Kwang Tung:* Tao Keou Ts'ao—; *Kwena:* Moxato—; *La Reunion:* Herbe d'Inde, Herbe zinde—; *Las Bela:* Charchuta, Obatkandri—; *Malayalam:* Katalati—; *Marathi:* Aghada, Aghara, Surat—; *Naguri:* Circiti—; *Pampangan:* Angud, Augod—; *Persian:* Kharevazhun—; *Porebunder:* Aghado, Aghedo—; *Punjab:* Kutri—; *Sadani:* Circithi—; *Sanskrit:* Adhoghanta, Adhvashalya, Aghamargava, Aghata, Apamarga, Apangaka, Chamatkara, Dhamargava, Durabhigraha, Durgraha, Kantarika, Kanti, Karkatapippali, Katumanjirika, Kharamanjari, Kini, Kishaparni, Ksharamadhya, Kshuraka, Kubja, Malakanta, Markati, Mayuraka, Pandukantaka, Parakpushpi, Pratyakparni, Pratyakpushpi, Shaikharika, Shkhari, Sthalamanjari, Talakata, Vasira—; *Sinhalese:* Gaskaralheba, Karalsebo—; *Suto:* Bohomane, Bohome-bo-bolelele, Lenamo, Mokxoathakxwale—; *Tagalog:* Decotdecot, Hangor, Hangot, Libay, Limai—; *Tamil:* Nayurivi—; *Telugu:* Antisha, Apamargamu, Uttareni—; *Tigrinia:* Maitjello, Mutschollo—; *Uraon:* Circithi—; *Visayan:* Hangor, Saramo—; *Zulu:* isiNama—.

2. **Achyranthes bidentata** Blume Bijid. 545.

A rambling herb distinguished from *A. aspera* by the blade of the spinous bracteoles being reduced to 2 minute auricles each side of the base of the spines, by the leaves being often much narrower elliptic to linear-lanceolate and glabrous or pubescent. The staminodes also are said to be toothed instead of fringed as in *A. aspera*.

Distribution: India.—China, Java, Japan.

The plant is used as a diuretic and astringent.

Assam: Apamarga, Bankhat—.

ALTERNANTHERA Forsk.

Herbs, usually prostrate. Leaves opposite. Flowers hermaphrodite, small, white, in axillary often clustered heads, bracteate and 2-bracteolate. Perianth-segments 5, unequal, the 2 lateral innermost and concave. Stamens 2-5; filaments short, connate in a cup with or without intervening staminodes; anthers 1-celled. Ovary suborbicular or ovoid; ovule solitary, pendulous from a long basal funicle; style very short; stigma capitellate (rarely 2-fid). Fruit a compressed orbicular or obcordate utricle often with thickened or winged margins. Seed inverse, lenticular; testa crustaceous; embryo annular, surrounding floury albumen; cotyledons narrow; radicle superior.—Species 70.—Tropics and subtropics.

A. sessilis R. Br. is used medicinally in Madagascar, *A. repens* O. Kuntze in the Gold Coast.

1. **Alternanthera sessilis** (Linn.) R. Br. Prodr. (1810) 417. —*A. triandra* Lam. Encycl. Méth. I (1783) 95.—PLATE 794.

Herbaceous, much-branched from the root; branches 15-50 cm. long, often purplish, prostrate or ascending, often rooting at the lower nodes, glabrous, the younger ones with 2 opposite lines of hairs. Leaves 1.3-5 by 0.3-2 cm. (in wet places sometimes reaching 10 by 2.5 cm.), somewhat fleshy, linear-oblong, lanceolate or elliptic; obtuse or subacute, sometimes obscurely denticulate, shortly petiolate, glabrous. Flowers sessile, white, shining, in small axillary sessile heads; bracteoles 1.25 mm. long, ovate, scarious. Perianth 2.5-3 mm.

long; sepals ovate, acute, scarious, 1-nerved. Ovary obcordate, broader than long, compressed; style very short; stigma capitellate. Utricle 1.5-2 by 2.5-3 mm., obcordate, compressed, with thickened margins. Seed 1.25-1.5 mm. diam., suborbicular.

Distribution: Throughout the warmer parts of India, Ceylon.—All warm countries.

Largely used in Ceylon as a lactagogue, also as a wash for the eyes.

Valued as a febrifuge in Malaya.

In Madagascar, the plant is much used as a galactagogue. It is given in baths for pruritus and phlyctena of young children.

The expressed juice or an aqueous extract of the stem and leaves is given internally with cow-ghee for snake-bite (Roberts), but this treatment is useless (Mhaskar and Caius).

Betsileo: Kimaroatody—; *Betsimisaraka:* Anamalaza—; *Bombay:* Kanchari—; *Canarese:* Honagonne—; *Gujerati:* Jalajambo, Panini-bhaju—; *Hova:* Anambalaza—; *Madras:* Pounanganni—; *Marathi:* Kanchari—; *New Zeland:* Mahuri—; *Rohilkhand:* Ghandughi—; *Sakalave:* Fotsimbarinakoho—; *Sinhalese:* Mokunuwanna—; *Sokoto:* Maikaindubu—.

CHENOPODIACEAE.

Herbs or shrubs. Leaves alternate (rarely opposite); stipules 0. Flowers small, usually green, hermaphrodite or 1-sexual; bracts 1 or 0; bracteoles 0 or 2. Perianth simple, sepaline; segments 3-5, free or connate, imbricate in bud (in female flowers sometimes 0). Stamens usually 5, opposite the perianth-segments, hypogynous or perigynous; filaments usually free, sometimes with intervening staminodes; anthers 2-celled. Ovary ovoid, globose or depressed, 1-celled; ovule solitary, basal or lateral, campylotropous; style terminal, short or long, stigma capitate, 2-3-lobed; or styles 2-3; or stigmas 2-5 free or slightly united, sessile. Fruit usually a utricle enclosed in the often enlarged fleshy perianth (when perianth is

present). Seed erect, inverse or horizontal; testa crustaceous, coriaceous or membranous; albumen fleshy or floury or 0; embryo curved, annular, or spiral.—Genera 75. Species 500.—Throughout the world.

A. Stem not jointed. Flowers clustered, all similar. Leaves flat. Stamens perigynous	
1. Utricle indehiscent. Perianth 5-partite	CHENOPODIUM.
2. Utricle indehiscent. Perianth 5-lobed, base thickened	BETA.
B. Stem not jointed. Flowers dimorphic; female flowers usually without perianth. Stamens perigynous	
Female flowers ebracteolate. Perianth 3-4-toothed	SPINACIA.
C. Stem not jointed. Flowers all similar. Utricle included in the usually enlarged perianth. Stamens hypogynous	
Fruiting perianth with transverse wings	KOCHIA.
D. Stem fleshy, usually jointed. Flowers bisexual, immersed in the cavities of the joints or between the scales of a fleshy cone	
1. Seed with fleshy albumen. Embryo semiannular	ARTHROCNEMUM.
2. Seed exalbuminous. Embryo conduplicate	SALICORNIA.
E. Utricle enclosed in the simply enlarged perianth. Stem not jointed	
Perianth 5-lobed. Leaves linear, fleshy	SUAEDA.
F. Utricle enclosed in the transversely winged perianth	
1. Stem jointed	HALOXYLON.
2. Stem not jointed	SALSOLA.
G. Stem twining. Bracteoles 2	
Filaments straight in bud. Embryo spiral	BASELLA.

Some are mucilaginous, emollient, refrigerant, and resolvent; others are strongly aromatic and powerful stimulants; the seeds of a few have emetic, cathartic, and anthelmintic properties.

OFFICIAL :—*Beta vulgaris* Linn. (Hungary, Spain, Switzerland); *B. vulgaris* Moq. var. *C* De Cand.=*B. Rapa* Dumort. (Portugal).

Chenopodium ambrosioides Linn. (Austria),—var. *anthelminticum* Gray (Belgium, Germany, Holland, Spain),—(Linne) A. Gray (United States).

CHENOPODIUM (Tourn.) Linn.

Annual or perennial erect or prostrate herbs. Leaves alternate, entire, lobed or toothed. Flowers minute, hermaphrodite (rarely polygamous), clustered, forming axillary and terminal simple or branched spikes or racemes; bracts and bracteoles 0. Perianth usually

(the upper leaves smaller and more entire than the lower), oblong, rhombic, deltoid or lanceolate, obtuse or acute, entire, toothed or irregularly lobulate; petioles long, slender. Flowers in clusters forming complex or lax paniculate often mealy spikes, which in cultivated forms become thyrsoid. Sepals 1.5-2 mm. long, oblong-lanceolate, keeled, closing over the thinly membranous utricle. Stigmas 2. Seed 1.5 mm. diam., orbicular, compressed, with an acute margin, smooth, shining; embryo completely annular.

Distribution: Occurring chiefly in cultivated ground, also cultivated as a pot-herb. —Ubiquitous.

The plant improves the appetite; oleaginous, anthelmintic, laxative, diuretic, aphrodisiac, tonic; useful in biliousness, "vata", and "kapha", abdominal pains, eye diseases, throat troubles, piles, diseases of the blood, the heart, the spleen (Ayurveda).

The plant is used as a laxative. It is used in the form of pot herb in piles.

The Zulus use an infusion as an enema for intestinal ulceration. The finely powdered leaves are used as a dusting powder about the external genitalia in children.

Afrikaans: Varkbossie—; *Arabic:* Kulf, Vaklatulhumakka—; *Bengal:* Bathusag, Bethuasag, Chandanbetu—; *Bombay:* Chakwit—; *Canarese:* Chakravati—; *Chaman:* Torsag—; *Chenab:* Irr—; *Chinese:* Hui Ti, Li—; *Deccan:* Kuljehkebaji—; *English:* All-good, Bacon Weed, Biacon Weed, Dirtweed, Dirty Dick, Drought-weed, Fat Hen, Frost-bite, Goosefoot, Hen-fat, Lamb's-quarters, Lamb's-tongue, Mails, Melgs, Midden, Milds, Miles, Milies, Muck-weed, Mutton-tops, Myles, Rag Jag, White Goosefoot, Wild Spinach—; *French:* Chénopode blanc, Chénopode sauvage, Drageline, Grageline, Grasseline, Herbe au vendangeron, Senousse—; *Gujerati:* Cheel, Tanko—; *Hindi:* Bathua, Bathusag,, Bethuasag, Chandanbedu, Chilli—; *Italian:* Farinaccio—; *Kharan*: Malerav—; *Ladak:* Em—; *Malta:* Bacon Weed, White Goosefoot, Farinaccio selvatico, Ghobbejra, Hobbejra—; *Marathi:* Chakavata, Chivil—; *Mundari:* Batuaara—; *North-Western Provinces:* Bethuwa, Bhutwa, Charai, Jausag—; *Persian:* Khurfa, Khuruelasafir—; *Punjab:* Bathu, Bathua,

Jausag, Lunak—; *Sanskrit:* Agralohita, Chakravarti, Chilli, Chillika, Gaudavastuka, Ghanaghana, Hilamochika, Kankella, Ksharadala, Ksharapatra, Mahaddala, Mridupatri, Panshupatra, Shakaraja, Shakarata, Shakashreshtha, Shakavira, Tuni, Vastu, Vastuka, Vastuki, Vasuka—; *Santali:* Bhatuaarak—; *Santal Parganas:* Khartuasag—; *Sind:* Jhil—; *South Africa:* Common pigweed, Goosefoot, Lamb's-quarters, White goosefoot; *Spanish:* Ceniglo blanco, Cenizo blanco—; *Suto:* Serue—; *Tamil:* Parupukkirai—; *Telugu:* Pappukura—; *Zulu:* umBikicane—.

2. **Chenopodium botrys** Linn. Sp. Pl. (1753) 219.—Plate 795B.

Strongly aromatic, glandular-pubescent; stems 15-45 cm.; branches numerous, spreading and recurved. Leaves stalked, oblong, 2.5-7.5 cm., pinnately lobed, the upper ones nearly entire. Flower-clusters in numerous, short, axillary panicles forming large, terminal panicles. Perianth glandular-pubescent. Seed smooth.

Distribution: From Kashmir to Sikkim, 4,000—14,000 ft.; Punjab.—Europe, N. & W. Asia, N. Africa, introduced into America.

In France and Southern Europe, it is used in catarrh and humoral asthma.

It is said to be a good substitute for *C. ambrosioides.*

Catalan: Botris, Herba per atacar la sanch, Xinxera—; *English:* Jerusalem Oak—; *French:* Chénopode ă grappes, Piment—; *Spanish:* Biengranada—.

3. **Chenopodium ambrosioides** Linn. Sp. Pl. (1753) 219.—Plate 796.

A tall erect much-branched highly aromatic herb with a camphoraceous odour, puberulous and glandular, not mealy; stem and branches striate, more or less glandular-pubescent. Leaves often with glands, 3.8-8 by 0.6-2.5 cm., oblong-lanceolate, obtuse or acute, sinuate-dentate, the upper leaves almost entire, base tapering, running down into a short often obscure petiole. Flowers minute, clustered, forming slender axillary and terminal simple or paniculate leafy spikes, sometimes polygamous. Sepals orbicular-ovate, concave,

obtuse, not keeled, closing over the fruit. Stigmas usually 5. Utricle membranous. Seed 0.85 mm. diam., orbicular, smooth, shining, with an obtuse margin.

Distribution: Bengal, Sylhet, Deccan, S. India.

The plant was used medicinally by the American Indians in the days of Columbus, and in South America infusions made from the leaves and seeds have been a household remedy against intestinal parasites from time immemorial.

The plant is used in Europe in pectoral complaints, and in nervous affections, particularly chorea.

An infusion of the herb is considered carminative, diaphoretic, and emmenagogue in Brazil. It is given in compression cough, pulmonary obstruction, amenorrhea, and is recommended for the expulsion of the dead foetus.

In Guiana, an infusion of the plant is used as a stomachic, the inflorescence is used as an anthelmintic.

In Madagascar and La Reunion, the juice of the plant is taken as a vermifuge. It is used externally in convulsions, intestinal worms, gangrenous ulcers, pyemia, gastralgia, and nervous affections.

The Zulus use an infusion as an enema for intestinal ulceration. The Sutos use the same for colds and stomach-ache. The Xosas use the seeds as an insecticide, usually as a powder, but sometimes as a decoction mixed with a decoction of blue-gum leaves.

The fruits and the volatile oil obtained from distilling the fruits with steam or water are used as anthelmintic chiefly for ascaris and ankylostomum. Powdered seeds from 20 to 30 grain doses were tried with negative results. But the oil in 10 minims doses expelled the hookworms (Koman).

Oil of chenopodium is a mixture in which the several constituents are present in varying proportions. It deteriorates with age and may easily be adulterated. It is highly toxic. It acts as a powerful vermicide both on ankylostomes and necators. The toxic and vermicidal properties reside in the same active principle, ascaridol, and are, therefore, interdependent. The optimum dose is different for

B. vulgaris Linn. is used medicinally in China. It is officially recognised as a source of sugar in Hungary, Portugal, Spain, and Switzerland.

1. **Beta vulgaris** Linn. Sp. Pl. (1753) 222.—Plate 797.

Annual or biennial, 30-50 cm. high; stems 1, simple or panicled. Root-leaves ovate, obtuse, cuneate, sometimes subcordate; cauline rhombic-ovate to lanceolate and linear. Flowers 2-3 in a cluster or solitary, arranged in long, slender, leafy or leafless, interrupted spikes; calyx herbaceous, lobes oblong, hooded, in fruit keeled, and thickened at the base into a tubercle; stigmas 2, ovate.

Distribution: Cultivated in many parts of India.—Native of the Mediterranean.

The leaves are tonic, diuretic, purgative; useful in inflammations, paralysis, headache, earache, diseases of the spleen and the liver.—The seeds are bitter; diuretic, expectorant, aphrodisiac, carminative, emmenagogue; good for inflammations; the oil is applied in localised pains.—The tuber is sweet; expectorant; good for inflammations and mental troubles; lessens appetite (Yunani).

The fresh leaves are applied to burns and bruises.

Arabic: Silikh—; *Bengal:* Bitpalang, Palak, Palangsag—; *Catalan:* Bleda, Bleda raba, Bleda vermella, Remolatxa—; *Chinese:* Nieou P'i Ts'ai, T'ien Ts'ai—; *Dutch:* Beet, Biet—; *English:* Beet—; *French:* Bette, Bette commune, Bette cultivée, Betterave, Betterave champêtre, Betterave sur terre, Brède de Bengal, Brède de l'Inde, Carde poirée, Disette, Racine d'abondance, Racine de disette, Poirée, Réparée—; *German:* Beisskohl, Bete, Gartenmangold, Mangold, Roemischer Kohl—; *Greek:* Sitlon, Titlon—; *Hindi:* Chukandar, Palak—; *Hungarian:* Vorosrepa—; *Italian:* Barbabietola, Bieta, Bietola, Carottole—; *Languedoc:* Bledaraba, Bledo, Erbeto, Orta—; *Malta:* Red Beet, Barbabietola, Pitravi—; *Mundari:* Arasalgam—; *Persian:* Chakundar—; *Polish:* Cwikla, *Portuguese:* Acelgas, Acelgas vermelhas, Beterraba—; *Roumanian:* Sfecia—; *Russian:* Sveklovitsa—; *Spanish:* Acelga, Remolacha—; *Urdu:* Chakundar—.

SPINACIA (Tourn.) Linn.

Annual herbs. Leaves attenuate. Flowers dioecious, ebracteate, males in terminal leafless spikes; females in axillary clusters. Male flowers : Sepals 4-5, herbaceous, simple. Stamens 4-5, filaments capillary. Female flowers : Perianth subglobose, 2-4-toothed; fruiting enclosing the utricle, coriaceous, unarmed or with 2-3 dorsal spines. Stigmas long, filiform, connate below. Utricle hard, compressed, adnate to the perianth. Seed vertical, testa thin, albumen floury; embryo annular.—Species 2.—E. Mediterranean.

S. oleracea Linn. is used medicinally in China.

1. **Spinacia oleracea** Linn. Sp. Pl. (1753) 1027.—PLATE 798.

Stem erect, from 30-60 cm. high, round, smooth, piped, succulent, sometimes reddish. Leaves alternate, the lower ones very long-petioled, variously lobed with lobes of an acute triangular shape, smooth on both sides. Male : Flowers on long terminal glomerate spikes, and on shorter ones from the axil; very numerous, sessile. Calyx 4-parted. Stamens 4. Anthers twin, very large. Female : Flowers axillary, sessile, crowded. Calyx 2-tipped, with a projecting horn in each side, growing into spines when the seed is ripe. Styles generally 4, white, tapering. Capsule 1-celled, 1-valved, armed, with 2 opposite short horns, and crowned with the small remaining calyx.

Distribution: Cultivated throughout India.—Native country unknown.

The plant is sweet; cooling, laxative, alexipharmic; useful in diseases of the blood and the brain, asthma, leprosy, biliousness; causes "kapha" (Ayurveda).

The leaves are cooling; emollient, wholesome, antipyretic, diuretic, maturant, laxative, digestible, anthelmintic; useful in urinary concretions, inflammation of the lungs and the bowels, sore throat, pain in the joints, thirst, lumbago, cold and sneezing, sore eyes, ringworm, scabies, leucoderma, scalding urine; arrest vomiting, biliousness, flatulence.—The seeds are useful in fevers, leucorrhœa, urinary discharges, lumbago, diseases of the brain and of the heart (Yunani).

The green plant is given for urinary calculi.

The seeds are laxative and cooling; they are used in difficult breathing, inflammation of the liver, and in jaundice.

Afghanistan: Spinaj—; *Arabic:* Ispanaj—; *Bengal:* Palang, Pinnis—; *Bombay:* Isfanaj, Palang—; *Catalan:* Espinach, Espinaga—; *Central Provinces:* Baji—; *Chinese:* Po Ling—; *English:* Garden Spinach—; *French:* Brède de France, Epinard, Epinard cultivé, Epinard grand, Epinard fros, Epinard de Hollande—; *German:* Spinat—; *Hindi:* Isfanaj, Palak, Palki, Pinnis, Sag, Sagpalak—; *Italian:* Spinace, Spinachia—; *North-Western Provinces:* Isfanaj, Palak—; *Persian:* Isfinaj, Ispanaka—; *Portuguese:* Espinafres—; *Punjab:* Bijpalak, Isfanak, Palak—; *Roumanian:* Spanac—; *Russian:* Shpinat—; *Sanskrit:* Chhurika, Chiritchhada, Gramini, Gramyavallabha, Kshurapatrika, Kshurika, Madhura, Palankya, Snigdhapatra, Supatra, Vastukakara—; *Sind:* Palak, Palakbij—; *Spanish:* Espinaca, Espinaca comun, Espinaca de Holanda—; *Tamil:* Vasaiyilaikkirai—; *Telugu:* Dumpabachhali, Matturbachhali—; *Urdu:* Palak—.

KOCHIA Roth.

Herbs or undershrubs usually villous or pubescent, stems slender. Leaves alternate, sessile, narrow, entire. Flowers axillary, solitary or clustered, hermaphrodite or female (rarely only male); bracts 0. Perianth subglobose; lobes 5, coriaceous, incurved, closing over the utricle, girt by 5 free or confluent horizontal wings. Stamens 5, usually exserted, inserted at the bottom of the perianth; anthers large, ovate. Ovary depressed-globose; style slender; stigmas 2-3, capillary. Utricle depressed, membranous. Seed horizontal, ovoid, or orbicular; testa membranous; albumen scanty; embryo annular.—Species 35. —N. temperate, Australia, S. Africa.

1. Leaves green, linear-lanceolate, acute .... 3. *K. scoparia.*
2. Leaves small, elliptic or linear-oblong, acute .... 1. *K. indica.*
3. Leaves fleshy, semiterete, filiform, pubescent, intermixed with longer hairs .... 2. *K. sedoides.*

K. scoparia Schrad. is used medicinally in China.

1. **Kochia indica** Wight Ic. (1852) t. 1791.—PLATE 799.

A tall erect branched annual; stem and branches more or less woolly, white, striate. Leaves 6-32 by 2.5-6 mm., linear-lanceolate, sessile, acute, pubescent or villous on both sides, base tapering. Flowers axillary; solitary or 2 together. Perianth woolly, about 2.5 mm. across when spread out, divided about 1/4 the way down; segments hooded, mucronate, incurved; wing broadly ovate, scarious. Utricle thinly membranous; stigmas 2, filiform, 0.85 mm. long. Seed 2.5 mm. diam., orbicular or ovoid, black.

Distribution: N.-W. India, Sind, Deccan Peninsula.—Afghanistan.

The plant is used as a cardiac stimulant in cases of weak and irregular heart, especially when following on fevers.

Punjab: Bui, Buichhoti, Kauraro—.

2. **Kochia sedoides** Schrad Neues. Journ. III (1809) III & IV, 85.

An annual herb. Stem erect, slightly rigid, canescent, tomentose; branches numerous, thin, erect, spreading. Leaves fleshy, semiterete, filiform, pubescent, intermixed with longer hairs. Flowers in glomerules of 2-3 forming thin lax or dense-flowered spikes; floral leaves linear, obtuse, longer than the glomerules. Fruiting perigone villous, with conical spines as long as the disk or shorter unarmed and often unequal.

Distribution: Caucasus, S. Europe, Soongaria, Siberia.

In Baluchistan, it is used as a medicine for worms. It is crushed in cold water and allowed to stand overnight, and swallowed in the morning with some sweetmeat (Hotson).

3. **Kochia scoparia** Schrad Neu. Journ. (1809) 85.

A tall herb, annual, 0.9-1.5 m., glabrous or pubescent, strict, erect; branches erect and stem white smooth, the ultimate twigs pilose or villous. Leaves 2.5-3.8 cm., green, linear-lanceolate, acute, midrib distinct. Clusters in leafy panicled spikes. Fruiting-perianth very variable, wings short, semicircular, scarious, nerved, entire, shorter than the diameter of the disk.

Distribution: N.-W. India.—N. and Central Asia to Japan and westwards to Spain.

The leaves and fruits are credited with cardiotonic properties by the Chinese.

Chinese: Ti Fu—.

ARTHROCNEMUM Moq.

Fleshy leafless jointed branching shrubs or herbs. Flowers minute, hermaphrodite, 2-3 together in the axils of scaly bracts, forming sessile cone-like spikes; bracteoles 2. Perianth ventricose, usually 3-4-gonous, truncate or 3-5-toothed at the apex, at length spongy. Stamen 1; anther oblong. Ovary ovoid, narrowed to the tip; ovule solitary, subsessile; stigmas 2, shortly connate below, subulate. Fruit an ovoid compressed utricle with hardened pericarp, enclosed in the swollen perianth. Seed erect, ovoid, compressed; testa membranous, smooth; albumen farinaceous; embryo dorsal, comma-shaped; radicle stout, inferior.—Species 8.—Coasts of the Old World.

The genus has no therapeutic value.

1. **Arthrocnemum indicum** Moq. Chenopod. Enum. (1840) 113.

Perennial, suffruticose, diffuse, glaucous-green; stems usually prostrate; branches numerous, with a woody core, erect or ascending, jointed, very fleshy, the joints short, clavate, thick, spongy, truncate, dilated and usually 2-toothed at the top. Flowers in cylindric blunt spikes 1.3-2 cm. long; bracteoles spongy. Anthers large, oblong-ovoid, 0.8-1 mm. long. Seed trigonous, much compressed; testa thin, crustaceous, yellow.

Distribution: Bengal, W. Peninsula.—Ceylon, tropical Africa.

The plant is alexipharmic (Ayurveda).

The ashes of the plant are prescribed in the treatment of snake-bite (Sushruta, Vagbhata) and scorpion-sting (Sushruta), but they are not an antidote to either snake-venom (Mhaskar and Caius) or scorpion-venom (Caius and Mhaskar).

Ceylon: Kotanai—; *Gujerati:* Bholado—; *Hindi:* Machola—; *Marathi:* Machura—; *Sanskrit:* Suvar—; *Tamil:* Kolliam, Pavalappundu, Tagal, Umari—; *Telugu:* Koyyapippali—.

SALICORNIA (Tourn.) Linn.

Fleshy jointed leafless branched shrubs or herbs. Flowers minute, hermaphrodite, 3-nate, in the axils of scaly bracts sunk in superposed and decussately opposite cavities of the internodes, forming sessile cone-like spikes; bracteoles 2. Perianth obpyramidal. Stamen 1; anther oblong. Ovary ovoid, narrowed to the tip; ovule subsessile; stigmas 2, subulate. Fruit an ovoid compressed utricle with membranous pericarp, enclosed in the spongy perianth. Seed erect, compressed; testa hispid with hooked hairs; albumen 0; embryo conduplicate; radicle inferior, parallel to the folds of the cotyledons. —Species 10.—On seacoasts.

The genus is therapeutically inactive, but is rich in alkali.

1. **Salicornia brachiata** Roxb. Fl. Ind. ed. Carey & Wall. I (1820) 82; Wight Ic. t. 738.—PLATE 800.

Shrubby, more or less erect, much-branched; branches rather slender, opposite, the joints 6-12 mm. long, slightly dilated and 2-toothed. Flowers in slender cylindric spikes 2.5-7.5 cm. long. Utricles membranous, ovoid, subacute. Seed pale brown, hispid with white hairs.

Distribution: Bengal, Kathiawar, Gujarat, W. Peninsula, Ceylon.

The ashes are used for the mange and the itch. They are considered emmenagogue and abortive.

Malayalam: Umari—; *Tamil:* Kattumari, Pavalappundu, Sittumari, Umari—; *Telugu:* Barillakoyalu, Koyyalu, Sakantipusalu—.

SUAEDA Forsk.

Herbs or shrubs usually growing in saline places. Leaves fleshy, ternate, terete (rarely flattish). Flowers minute, axillary usually hermaphrodite, bracteate and 2-bracteolate. Perianth short,

globose or urceolate, 5-lobed or 5-partite; segments equal or unequal, simple, gibbous or almost winged. Stamens 5; filaments short; anthers large. Ovary ovoid or orbicular, usually sessile, with a wide base, adnate below to the perianth, rounded or truncate at the apex; ovule solitary, subsessile; style 0; stigmas 2-5, minute subulate, recurved, papillose throughout. Fruit a small membranous or spongy utricle included in the perianth. Seed erect, horizontal or oblique; testa coriaceous or crustaceous; albumen 0 or scanty; embryo slender, somewhat spiral.—Species 40.—Cosmopolitan, on seacoast and in salt-steppes.

1. Leaves half-terete, linear or ellipsoid, obtuse .... 1. *S. fruticosa.*
2. Leaves linear, flattish, obtuse .... 2. *S. monoica.*

The genus has no therapeutical value; but is rich in alkali.

1. **Suaeda fruticosa** Forsk. Fl. Aegypt.-Arab. (1775) 70.—Plate 801A.

Shrubby, usually erect, much-branched; stem pale, glabrous. Leaves fleshy, subsessile, ½-terete, variable, 5-16 by 1.5-3 mm., linear-oblong or ellipsoid or somewhat obovate, obtuse, narrowed at the base, the floral leaves short. Flowers hermaphrodite, axillary, solitary or 2-3-nate; bracteoles membranous, about 1.2 mm. long, ovate, acute, entire or with slightly denticulate margins. Perianth in fruit subglobose, 2.5 mm. long; segments thick, oblong, concave, obtuse, incurved. Utricle obovoid, thickened at the top; stigmas 3, short, spreading. Seed 1 mm. long, obliquely ovoid, somewhat beaked, slightly compressed, smooth and shining, black when ripe.

Distribution: N.-W. India, Punjab, Sind, Baluchistan, Kathiawar, W. Peninsula.—Africa, America.

The woolly excrescenses on the tips of its branches, mixed with an empyreumatic oil, are used as an application to sores on the backs of camels. The leaves are applied as a poultice to ophthalmia, and used, infused in water, as an emetic by Sindhis.

It is said to produce a persistent black diarrhæa, and death, in sheep (Steyn).

Afghanistan: Shorag—; *Afrikaans:* Inkbos—; *English:* Seablite, Shrubby Seablite—; *Kila Saifulla:* Spinazmai, Zmai—; *Kohlu:* Lani—; *Malta:* Sea Blite, White Glasswort, Suejda, Ghobbejia tar-Rmied—; *Marathi:* Morasa—; *Punjab:* Baggilana, Dana, Kharkhusa, Khaskhasa, Lunak, Phesaklane, Usaklani, Zamai—; *Pushtu:* Zimeh—; *Sibi:* Lani—; *Sind:* Ushulani—; *Shahrig:* Lani, Zmai—; *South Africa:* Inkbush, Shrubby saltwort—; *Spanish:* Almajo, Almajo dulce, Sosa fina de Andalucia, Sosa prima—.

2. **Suaeda monoica** Forsk. Fl. Aegypt.-Arab. (1775) 70; Wight Ic. t. 1792.

A small erect bush; branches numerous, ascending, marked with prominent leaf-scars, pale, glabrous. Leaves sessile, 1.2-2.5 cm. by 1.25-2.5 mm., linear, obtuse or subacute, sometimes apiculate, bright green. Flowers polygamous, in slender lax spikes, the clusters distant, each in the axil of a short leaf; bracteoles minute, ovate, acute, entire. Perianth 2.5 mm. long; segments oblong, obtuse. Stigmas 2-5, short. Seed vertical, ovoid, smooth, shining, black.

Distribution: Baluchistan, Sind, Konkan, E. coast from the Kistna southwards, Ceylon.—Arabia, tropical Africa.

At Wad in Jhalawan, the plant is made into an ointment for wounds (Hughes-Buller).

Jhalawan: Righat—; *Kalat:* Righat—; *South Arcot:* Umarinandi—; *Tamil:* Karuvumari—; *Telugu:* Koyyalakura—; *Tigré:* Hœttum—; *Uriya:* Nunia—.

SALSOLA Linn.

Herbs or shrubs; branches not jointed. Leaves usually alternate, sessile or amplexicaul, often pungent at the tip. Flowers hermaphrodite, axillary, solitary or fascicled; bracteoles 2. Perianth 5-(rarely 4-) partite; segments concave, accrescent in fruit, usually furnished with a broad scarious horizontal wing attached above the middle completely embracing the utricle. Stamens 5 or fewer, usually hypogynous. Utricle ovoid or subglobose, fleshy or membranous; stigmas 2-3, subulate or linear. Seed usually horizontal;

testa membranous; albumen 0; embryo spiral.—Species 40.—Cosmopolitan, maritime or on salt-steppes.

1. Annual spinescent herbs .... 1. *S. kali.*
2. Unarmed shrubs .... 2. *S. foetida.*

The genus is an important source of barilla.

S. kali Linn. and *S. tamaricifolia* Cav. are credited with anthelmintic properties.

1. **Salsola kali** Linn. Sp. Pl. (1753) 222.—PLATE 801B.

A rigid procumbent or diffusely branched herb, 15-25 cm. long; stem stout, grooved and angled, scabrid-pubescent or almost glabrous; branches spreading, often striped. Leaves spreading and recurved, variable in size, 0.63-2.5 cm. long or more, ovate-subulate with a rigid pungent point, sheathing at the base, thick and fleshy, semiterete; the uppermost shorter and broader, almost triangular. Flowers solitary and sessile in the axils of the leaves, sometimes appearing clustered from the reduction of axillary flowering branches, each flower with 2 opposite bracteoles; floral leaves and bracteoles all pungent. Fruiting perianth about 0.63 cm. diam., shorter than the bracteoles, 5-partite; segments rigid and cartilaginous at the base, furnished above with 5 broad spreading scarious wings.

Distribution: N.-W. Punjab, Kashmir 12,000-14,000 ft., Baluchistan.—Westward to the Atlantic, N. Asia, N. and S. Africa, N. America.

The plant is used as a remedy for worms.

Arabic: Elkali—; *Catalan:* Barrella borda, Barrella espinosa, Barrella punxosa—; *English:* Eestridge, Kelpwort, Prickly Glasswort, Prickly Saltwort, Saltwort, Sea Thrift, Sowd-wort—; *French:* Marie épineuse, Marie vulgaire, Salicor, Salicotte, Salsovie, Sonde commune—; *Italian:* Riscolo—; *Jhalawan:* Jaghun—; *Kharan:* Jhagun—; *Malta:* Prickly Saltwort, Erba Cali, Riscolo, Soda, Haxixa tar-Rmied—; *Punjab:* Sajjibuti—; *South Africa:* Russian Tumble Weed, Saltwort—; *Spanish:* Barrilla pinchuda, Espinardo, Mata pinchuda, Pincho—.

2. **Salsola foetida** Del. Fl. Aegypt. 57.—*S. spinescens* Wight Ic. t. 1795.

A large excessively branched pale hoary shrub, reaching 1.2 m. or more in height; branches numerous, slender, twiggy. Leaves minute, suborbicular, fleshy, the floral leaves imbricate, forming very short cylindrical spikes; bracteoles 1.2 mm. long, broadly ovate or orbicular, fleshy. Perianth scarcely 1.2 mm. long, oblong, rounded at the apex; wings horizontal, attached about the middle of the back of the perianth, 2.5 mm. long, obovate, rounded flat, thinly membranous, subtransparent, white, shining. Ovary ovoid or subglobose; stigmas 2, large, recurved.

Distribution: Upper Gangetic Plain, Punjab Plain, Sind, Baluchistan.—Afghanistan to N. Africa.

The plant is used as a vermifuge. The ashes are applied to itch.

Ormara: Hashok—; *Punjab:* Goralane, Lanagora, Motilane—; *Pushtu:* Shora, Shorag—; *Sibi:* Lana—; *Sind:* Lanan—; *Telugu:* Ellakura—.

Basella Linn.

A much-branched twining fleshy glabrous herb. Leaves alternate, broad, entire. Flowers hermaphrodite, sessile, spicate; bracts minute, caducous; bracteoles 2, connate in a 2-lipped cup and adnate to the perianth. Perianth fleshy, 5-fid, becoming at length berry-like in fruit; lobes short, incurved. Stamens 5, inserted on the mouth of the perianth-tube; filaments short, erect in bud; anthers versatile. Ovary globose; ovule subsessile; styles 3, connate at the base; stigmas linear-clavate, papillose within. Fruit a globose utricle, included in the fleshy perianth; pericarp thin, adnate to the seed. Seed erect, subglobose; testa crustaceous; albumen scanty; embryo plano-spiral; cotyledons large, thin, convolute.—Species 2.—Asia and tropical Africa.

B. rubra Linn. is used medicinally in China.

1. **Basella rubra** Linn. Sp. Pl. (1753) 272.—*B. alba* Linn. l. c.; Wight Ic. t. 896.—PLATE 802.

A perennial herb; stem very long, slender, twining to the right, succulent, glabrous, much-branched. Leaves 5-12.5 by 2.5-7.5 cm. (often larger under cultivation), broadly ovate, acute or acuminate, thick, apiculate, entire, base often cordate, narrowed into the petiole; petioles 1.2-2.5 cm. long. Flowers white or red, sessile, few, in lax pedunculate spikes 2.5-15 cm. long; bracts small, apiculate, bracteoles rather longer than the perianth, oblong, obtuse. Perianth divided about ½-way down; segments elliptic, obtuse. Fruit of the size of a pea, red, white or black.

Distribution: Throughout India, wild or cultivated, Ceylon.—Tropical Asia and Africa.

The herb is acrid, sweetish; heating, soporific, narcotic, aphrodisiac, fattening, laxative; improves the appetite; useful in biliousness, leprosy, dysentery, ulcers; causes " kapha " (Ayurveda).

The herb is sour; tonic, narcotic, aphrodisiac; antipyretic; improves the voice; applied to burns (Yunani).

The leaves made into a pulp are used as a maturant. They are demulcent and diuretic, useful in gonorrhœa and balanitis.

The juice of the leaves is a popular application to allay the heat and itching of urticaria arising from dyspepsia.

Bengal: Puisak, Ruktopui—; *Bombay:* Mayakbhaji, Velgond—; *Canarese:* Bilibasaleballi, Kempabasale, Kempubasale—; *Chinese:* Lo K'uei, Yen chih—; *Cutch:* Poi—; *Deccan:* Lalbachla, Sufedbachla—; *English:* Indian Spinach—; *French:* Epinard d'Amerique, Epinard de Chine, Epinard des Indes—; *Gujerati:* Pothi, Pothinivel, Valchibhagi—; *Hindi:* Bonpoi, Lalbachlu, Myalkibhaji, Poi, Poikivel, Sufedbachla—; *Ilocano:* Ilaibaquin—; *Konkani:* Valchibhagi—; *Madras:* Pasalei—; *Malayalam:* Basellakkira, Chovvaunabasellakkira—; *Marathi:* Mayalachivel, Mayalu, Wahlea—; *Portuguese:* Bretalho—; *Sanskrit:* Apodika, Kalambi, Madushaka, Mohini, Pichhila, Pichhilachhada, Potaki, Putika, Upodaki, Upodika, Upoti, Valipodaki, Vishala, Vishvatulasi, Vrishchikapriya—; *Sind:* Poi—; *Sinhalese:* Niviti—; *Tagalog:* Libato—; *Tamil:* Shivappuvaslakkirai,

Vaslakkirai—; *Telugu:* Allabatsalla, Alubachchali, Ettaalubachchali, Karubachchali, Peddabachchali, Peddamattuniatkubatsala, Polambachchali—; *Twi:* Aifan—; *Urdu:* Poh—; *Visayan:* Alugbati—.

HALOXYLON Bunge.

Shrubs or small trees with opposite jointed branches. Leaves opposite, triangular and short, or elongate and terete. Flowers small, hermaphrodite, solitary or spicate; bracteoles 2. Perianth 5-partite; segments concave, accrescent, horizontally winged. Stamens 5 or fewer, on the margin or base of a cupular disk with alternating round or square staminodes; filaments linear-subulate; anthers ellipsoid, obtuse. Utricle subglobose or depressed, enclosed in the perianth; stigma 2-lobed, or stigmas 3-4, recurved. Seed horizontal; testa membranous; albumen 0; embryo green, planospiral.—Species 10.—Mediterranean, C. Asia.

1. Leaves reduced to the dilated tips of the joints .... 1. *H. salicornicum.*
2. Leaves distinct .... 2. *H. recurvum.*

The genus is considered poisonous.

1. **Haloxylon salicornicum** Bunge ex Boiss. Fl. Or. IV (1879) 949.

An erect, much-branched leafless shrub; stem and branches pale yellow, not drying black, the joints produced into 2 long triangular points which take the place of leaves and are woolly within. Flowers in erect spikes; bracteoles 1.5 mm. long, nearly as broad as long, elliptic or obovate, rounded at the top, very thick, with woolly axils and membranous margins. Perianth-segments in flower 2 mm. long; wing 2.5 mm. long, orbicular-obovate, veined, membranous, attached to the back of the segment above the middle. Seed horizontal, 1.5 mm. diam., flattened, orbicular.

Distribution: Punjab, Baluchistan, Sind.—Afghanistan.

The plant is poisonous.

Babihan: Shor—; *Khad Valley:* Mati—; *Kharan:* Mati—;

Kulanch: Traht—; *Loralai:* Zahrbuti—; *Nushki:* Lana, Lundra—; *Panjpai:* Pirkai—; *Shahrig:* Shor—.

2. **Haloxylon recurvum** Bunge ex Boiss. Fl. Or. IV (1879) 949.—*Caroxylon indicum* Wight Ic. t. 1794.

A straggling bush turning black in drying, glabrous, pruinose, with divaricate spreading straight or recurved branches. Leaves 3-8 mm. long, trigonous or ½-terete, ovate-subulate or ellipsoid, obtuse or acute, spreading or recurved. Flowers axillary, forming strict spikes 2.5-15 cm. long; floral leaves 2.5 mm. long, rotund-ovate, fleshy, with membranous margins; bracteoles 2.5 by 1.5 mm., elliptic-oblong, concave, fleshy, with membranous margins. Perianth-segments somewhat fleshy, 4-5 mm. long, ovate, subobtuse, closing over the utricle; wing membranous, finely veined, about 2 mm. long, orbicular, attached at the middle of the back of the segment. Seed 2.5 mm. diam., orbicular, flattened; embryo spirally coiled.

Distribution: Punjab, Sind, Rajputana Desert, Burma, Coimbatore—Afghanistan, Yunnan.

The plant is said to be poisonous.

Las Bela: Khar, Lanson—; *Panjpai:* Surgal—; *Sibi:* Khar—; *Uthal:* Khar, Lanson—.

PHYTOLACCACEAE

Glabrous trees shrubs or herbs. Leaves alternate, quite entire; stipules small or 0. Flowers racemed, bracteate and 2-bracteolate. Sepals 4-5, imbricate in bud. Petals 0. Stamens 4, alternate with the petals, or more and irregularly inserted; filaments usually persistent and anthers deciduous. Carpels 1 or more, superior, free or connate, 1-ovuled; stigmas usually sessile and recurved; ovules amphitropous or campylotropous. Ripe carpels dry or fleshy. Seeds erect, often arillate; albumen fleshy or floury; embryo peripheric.—Genera 22. Species 120.—Chiefly tropical America and S. Africa.

More or less acrid and narcotic, vesicant, emetic and cathartic.

PHYTOLACCA Tourn. ex Linn.

Shrubs or herbs, rarely trees. Leaves exstipulate. Flowers 1-2-sexual. Sepals 4, oblong, obtuse. Stamens 5-25. Carpels 5-10 free or connate, fleshy in fruit. Seeds reniform, compressed, exarillate, albumen floury; embryo annular, cotyledons slender, radicle ascending.—Species 26.—Tropical and subtropical regions.

Insecticidal, anthelmintic, and vulnerant. The root is bechic, emetic, and mildly purgative.

The following species are used medicinally in Catalonia—*P. decandra* Lin.—; in China—*P. acinosa* Roxb.—; in Abyssinia and Madagascar—*P. abyssinica* Hoffm.—; in Rhodesia—*P. abyssinica* Hoffm., *P. heptandra* Retz.—; in La Reunion—*P. decandra* Linn.—; in South Africa—*P. abyssinica* Hoffm., *P. decandra* Linn., *P. heptandra* Retz., *P. stricta* Hoffm.—; in North America, the West Indies, Paraguay—*P. decandra* Linn.—; in Mexico—*P. icosandra* Linn.—; in Guiana—*P. icosandra* Linn., *P. decandra* Linn.—.

1. **Phytolacca acinosa** Roxb. Fl. Ind. II (1832) 458.—PLATE 803.

Herbaceous, quite glabrous or puberulous; stems 0.9-1.5 m., stout, succulent. Leaves 15-25 by 6.3-10 cm., green, thinly succulent, elliptic-ovate or lanceolate-acuminate, narrowed into a stout petiole. Recemes shortly peduncled, 5-15 cm. long, erect, many-flowered; rhachis stout; bracts linear-lanceolate, membranous; pedicels 6 mm. Flowers 8 mm. diam. Sepals broadly oblong, obtuse. Ripe carpels about 10, nearly free, blue-black.

Distribution: Temperate Himalaya, wild or cultivated, from Hazara and Kashmir to Bhutan, 5,000—9,000 ft.—China, Japan.

The oil from the root is used for pain in the joints (Yunani).

The natives do not appear to use any part of the plant as a medicine, but in every district in which it is cultivated they seem to be fully aware of its power of producing delirium. It is commonly stated that the poisonous property is only destroyed by complete boiling.

Chinese: Shang Lu—; *English:* Sweet Belladonna—; *Kumaon:* Jirrag—; *Persian:* Sarangun—; *Punjab:* Burgu, Denturu, Jirka, Lubar, Matazor, Rinsag, Sarunga—; *Urdu:* Sarangun—.

POLYGONACEAE.

Herbs, rarely shrubs, very rarely trees. Leaves alternate (rarely opposite), entire or serrulate; stipules (ocreæ) scarious or membranous, usually sheathing the stem. Flowers usually small, hermaphrodite (rarely polygamous), regular, solitary or in small bracteate clusters in spike-like inflorescence; pedicels usually articulate. Perianth simple, inferior; lobes or segments 3-6, free or connate, persistent, imbricate in bud. Stamens 5-8 (rarely more or fewer), opposite the perianth-segments; filaments filiform, free or connate below in a ring; anthers 2-celled, usually versatile. Disk annular, glandular or 0. Ovary superior, sessile, free, 1-celled, 2-4-gonous; ovule solitary, orthotropous, sessile or at the end of a distinct funicle; styles 3 or 2 (rarely 4), often short, free or somewhat connate; stigmas capitate, peltate or fimbriate. Fruit a small hard, usually 3- (rarely 4-) gonous or biconvex nut enclosed in the perianth. Seed erect; testa membranous; albumen copious, floury, sometimes ruminate; embryo lateral, straight, curved or sometimes peripheric; radicle superior.—Genera 40. Species 750.—Chiefly N. temperate, a few tropic, arctic and southern.

A. Perianth 3-5-cleft. Stamens 1-8, rarely more. Stigmas 2-3, capitellate, rarely fimbriate
  1. Stamens 12-18. Styles 4 .... CALLIGONUM.
  2. Stamens 8. Styles 3 .... PTEROPYRUM.
  3. Stamens 8 or fewer. Cotyledons flat .... POLYGONUM.
  4. Stamens 8. Cotyledons plaited .... FAGOPYRUM.

B. Perianth 4-6-cleft. Stamens 9 rarely 6. Stigmas fimbriate, peltate or horseshoe-shaped
  1. Sepals 6, unchanged in fruit. Nut 3-winged .... RHEUM.
  2. Sepals 4, unchanged in fruit. Nut 2-winged .... OXYRIA.
  3. Sepals 6, 3 inner enlarged in fruit (except *R. acetosella*) .. RUMEX.

The leaves and leaf stalks are generally acid, astringent, and tonic; the roots are nauseous, purgative, depurative antiscorbutic.

The Polygonaceæ contain acids—oxalic, citric, malic—and glucosides—chrysophanein, emodin, polydatoside, polygonin, rhapontin, rhein, rheochrysin—.

OFFICIAL:—*Polygonum bistorta* Linn. (Belgium, France, Russia)=*P. ellipticum* Willd. (Portugal); *P. Hydropiper* Linn. (Russia); *P. aviculare* Linn. (Austria).

Rheum spp. (Austria, Denmark, France, Great Britain, Holland, Japan, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, United States); *R. officinale* Baillon (Austria, Denmark, Hungary, Italy, Portugal, Russia, Spain, Switzerland, United States),—H. Bn. (Belgium, France); *R. palmatum* Linn. (Austria, Denmark, Great Britain, Hungary, Italy, Russia, Sweden, Switzerland, United States),—var. *tanguticum* Maxim. (Belgium, Germany, Spain, Turkey); *R. rhaponticum* Linn. (France); *R. tanguticum* Tschirch (Japan); *R. undulatum* Linn. (Italy).

CALLIGONUM Linn.

Rigid, much-branched shrubs. Leaves alternate, narrowly linear or subulate, sometimes very small or almost obsolete; stipules short, membranous. Flowers hermaphrodite, solitary or few, loosely clustered, ocreate; pedicels short; bracteoles 0. Perianth 5-partite; segments flat. Stamens 12-18. Ovary 4-gonous, the angles variously crested, winged, echinate or setose. Seed oblong, terete or 4-gonous; testa thin; embryo central, straight; cotyledons narrow.—Species 20. —N. Africa, S. Europe, W. Asia.

The genus is therapeutically inert.

1. **Calligonum polygonoides** Linn. Sp. Pl. (1753) 530.—PLATE 804.

An almost leafless shrub; branches terete, pale, glabrous, the internodes 2.5-3.8 cm. long; flowering branchlets slender; stipules short, membranous, cup-shaped, obliquely truncate and produced upwards at one side. Flowers pinkish, fascicled in the axils of the ocreæ; pedicels 1.5-2.5 mm. long. Perianth about 3 mm. long,

divided about $^2/_3$ the way down; segments obovate, cuneate. Ovary tuberculate; style 4, slightly connate at the base; stigmas capitate. Nucleus of the fruit 6-8 mm. long, oblong, densely clothed with numerous branched reddish brown bristles dilated at the base.

Distribution: Punjab, Rajputana, Sind, Baluchistan.—Persia, Armenia, Syria.

The roots, bruised and boiled in combination with catechu, are used as a gargle for sore gums (Murray).

Afghanistan: Balanja, Berwaja, Tatuke—; *Kharan:* Poga—; *Punjab:* Phog, Phogalli, Phok, Tirni—; *Sind:* Phog, Phogalli, Phok, Tirni—; *Trans-Indus:* Balanja, Berwaja, Tatuke—; *Uthal:* Pichungar—.

PTEROPYRUM Jaub. & Spach.

Rigid shrubs with twiggy branches. Leaves small, alternate or fascicled, linear or spathulate; stipules very short or obsolete. Flowers small, hermaphrodite, ocreate; pedicels filiform; bracteoles 0. Perianth 5-partite; segments subequal. Stamens 8; filaments filiform, attached to a pilose ring; anthers oblong. Ovary 3-gonous, acuminate; styles 3; stigmas capitate. Nut broadly 3-winged, beaked. Seed beaked, base broad; embryo eccentric, slightly curved; cotyledons oblong, much shorter than the radicle.—Species 5.—S.-W. Asia.

The genus is not therapeutically defined.

1. **Pteropyrum olivierii** Jaub. & Spach Ill. Plant. Orient. II (1844) 9, t. 108; Wight Ic. t. 1809.

A much-branched glabrous shrub; branches twiggy with white bark. Leaves 6-16 by 2.5-4 mm., spathulate-oblong, entire, fascicled, nerveless, the young ones often with revolute margins; petioles short, filiform; stipules thinly membranous, appressed to the branch, truncate, produced at one or both sides into a triangular appendage. Flowers in many-flowered fascicles; pedicels filiform, articulated below the middle. Perianth pink-coloured; segments connate at the base into a short tube, the 3 inner segments the largest, obovate-oblong.

Stamens 8, of which the 5 shorter are alternate with the perianth-segments, the other 3 opposite the larger inner segments; filaments inserted on a hairy ring; anthers oblong, versatile. Fruit 3-winged, but appearing to be 6-winged owing to the twist received at the neck by which the upper halves of the wings become alternate with the lower.

Distribution: Sind, Baluchistan.—Afghanistan, Persia.

In Las Bela, it is considered a cure for sore throat and is used for disinfecting pots and milk (Hughes-Buller).

Jhalawan: Karwankush—; *Kila Saifulla:* Gharawangi, Grong, Karwankushki—; *Las Bela:* Wekha, Wekho—.

POLYGONUM (Tourn.) Linn.

Herbs (rarely shrubs), usually erect. Leaves alternate; stipules membranous, connate into a tubular ocrea. Flowers hermaphrodite, small or minute, axillary or terminal, the clusters sessile or in spiciform capitate or panicled racemes; pedicels short, usually jointed under the perianth; bracts and bracteoles membranous, ocreate. Perianth green or coloured, 4-5- (rarely 3-) cleft. Stamens 5-8 (rarely 1-4), perigynous; filaments filiform, often dilated at the base, or alternate with the lobes of an annular or glandular disk; anthers 2-celled, the cells distinct, jointed by a small connective. Ovary compressed or 3-gonous; ovules solitary, usually stipitate; styles 2 or 3, free or slightly connate below; stigma capitate. Fruit a compressed or 3-gonous nutlet with obtuse or acute angles, covered by the persistent perianth; pericarp usually hard, shining or dull. Seed albuminous; embryo lateral or eccentric; radicle long; cotyledons usually small.—Species 275.—Cosmopolitan, but especially temperate.

A. Herbs. Leaves small, stipules hyaline, cleft or torn. Flowers axillary. Styles minute, free
   I. Branches procumbent or ascending .... 1. *P. aviculare.*
   II. Prostrate .... 2. *P. plebejum.*
B. Perennial-rooted herbs. Flowers in spiciform racemes. Bracts tubular truncate. Nut orbicular .... 11. *P. orientale.*

C. A perennial-rooted tall herb. Leaves broad. Flowers distant in very slender racemes. Bracts tubular. Nut flattened with 2 rigid persistent hooked styles .... 12. *P. virginianum.*
D. Erect or prostrate, annual or perennial-rooted herbs. Flowers in spiciform racemes. Bracts hyaline, ovate or lanceolate, not tubular
   I. Spikes stout .... 13. *P. sphaerostachyum.*
   II. Spikes slender .... 3. *P. viviparum.*
E. Erect or decumbent, annuals or perennials. Leaves narrow. Flowers in slender or dense spiciform racemes. Bracts tubular
   I. Styles 2, rarely 3. Nut biconvex (see also *hydropiper*)
      a. Leaves subsessile .... 5. *P. persicaria.*
      b. Leaves petioled .... 4. *P. glabrum.*
   II. Styles 3, rarely 2. Nut trigonous, rarely biconvex
      a. Leaves 10-18 cm., lanceolate or linear-lanceolate, acuminate, except the ciliolate margins and midrib beneath .... 6. *P. barbatum.*
      b. Leaves 5-10 cm., subsessile, linear or elliptic-oblong or lanceolate, acute or acuminate, glabrous or sparsely hairy beneath .... 14. *P. serrulatum.*
      c. Leaves subsessile or petioled, lanceolate or oblong-lanceolate, glabrous or with the costa scabrid beneath 7. *P. hydropiper.*
F. Erect or prostrate, annuals or perennials or shrubs. Leaves broad, sometimes lobed or auricled. Flowers capitate. Bracts not tubular
   I. An annual .... 8. *P. punctatum.*
   II. A shrub .... 10. *P. chinense.*
G. Erect shrubs, rarely herbs. Flowers in branched panicles. Bracts open or very shortly tubular .... 9. *P. molle.*

Demulcent and pectoral, astringent and tonic, diuretic, emetic, purgative, vesicant, vulnerary, insecticide, anthelmintic.

The following species are used medicinally in Europe *P. aviculare* Linn., *P. bistorta* Linn., *P. dumetorum* Linn., *P. hydropiper* Linn., *P. lapathifolium* Linn., *P. maritimum* Linn., *P. persicaria* Linn.—; in China—*P. aviculare* Linn., *P. barbatum* Linn., *P. bistorta* Linn., *P. blumei* Meisn., *P. chinense* Linn., *P. cuspidatum* S. & Z., *P. hydropiper* Linn., *P. japonicum* Meisn., *P. multiflorum* Thunb., *P. orientale* Linn., *P. serrulatum* Lag., *P. tenuicaule* Biss. & Mre., *P. tinctorium* Ait., *P. virginianum* Linn.—; in Annam—*P. hydropiper* Linn.—; in Cambodia—*P. odoratum* Lour.—; in Malaya—*P. aviculare* Linn., *P. multiflorum* Thunb.—; in La Reunion—*P. poiretii* Meisn.—; In South Africa—*P. barbatum* Linn.

P. serrulatum Lag., *P. tomentosum* Willd. var. *glabrum*—; in Brazil—*P. acre* H. B. K., *P. acuminatum* H. B. K., *P. stypticum* Cham. & Schlecht.—; in North America—*P. acre* H. B. K.—.

OFFICIAL:—The rhizome of *P. bistorta* Linn. (Belgium, France, Russia)=*P. ellipticum* Willd. (Portugal).

The herb of *P. Hydropiper* Linn. in Russia; *P. aviculare* Linn. in Austria.

1. **Polygonum aviculare** Linn. Sp. Pl. (1753) 362.—PLATE 805A.

Stems and branches prostrate, 30-60 cm., smooth, leafy, finely grooved, flowering throughout their length or sometimes barren. Leaves nearly sessile, narrowly lanceolate, 1.3-2.5 cm., sometimes glandular-dotted; stipules tubular, long, nerves several, strong, straight, the tips more or less projecting. Flowers small, green, tipped with white or red, axillary clusters. Perianth 4- or 5- parted. Stamens 4 or 5. Styles 3, free, minute. Nut 3-angled, minutely wrinkled.

Distribution: From Kashmir to Kumaon, 6,000—12,000 ft.—N. Asia, Europe.

The plant is astringent, styptic, antipyretic.—The seeds are laxative, diuretic; good for burning, pain in the stomach, pain in the bladder, erysipelas (Yunani).

In Chumba, the dried root is applied externally as an anodyne.

In Kashmir, the seeds are used as an emetic and purgative.

The herb is considered astringent in Europe. The infusion has been found beneficial in diarrhœa and children's summer complaints.

The whole plant is used medicinally in China as a demulcent, pectoral, astringent, tonic, and diuretic. It is used in Malaya for gonorrhœa.

Arabic: Asararai, Batbat—; *Bengal:* Machutie—; *Catalan:* Centinodi, Curriola, Escanyavellas, Herba de cent nusos, Passacamins—; *Chinese:* Pien Hsu—; *Dutch:* Hardbloem, Varkensgras—; *English:* Allseed, Armstrong, Beggar-weed, Bird's Knotgrass, Bird's Tongue, Black Shap, Bloodwort, Centinode, Cow-grass, Crab-grass, Crab-weed, Cumberfield, Doorweed, Finzach, Hogweed, Iron-grass, Knot, Knotgrass, Knot Weed, Knotwort, Mantie, Nine-joints,

Ninety-Knot, Pig-grass, Pig-rush, Pig-weed, Pink-weed, Red Legs, Red Robin, Redweed, Sparrow-tongue, Stone-weed, Surface Twitch, Swine-carse, Swine's grass, Swine's Skir, Tackers-grass, Way Grass, Wiregrass, Wireweed—; *French:* Achée, Aviculaire, Carogée, Carouge, Centenode, Centinode, Corrigiole mâle, Corriglole, Crépinette, Fausse senille, Herbe à cochon, Herbe à cent noeuds, Herbe aux panaris, Herbe de pourceau, Herbe de Saint Innocent, Herbe des Saints Innocents, Herniole, Langue de passereau, Lieglane, Mille-graine, Polygone des oiseaux, Polygonon, Renne, Renouée, Renouée aviculaire, Renouée des oiseaux, Rouille, Salouche, Sanguinaire, Tirasse, Tire-goret, Trainasse, Traine, Trame—; *German:* Eilegras, Ferkelgras, Ferkelkraut, Hanselamweg, Huehnerserb, Ihlglas, Innocenzkraut, Jungferntritt, Knauel, Knoeterich, Knotengras, Knotenwegerich, Kurwell, Saugras, Saukraut, Schweinegruse, Swienegras, Taennegras, Tausendknoeterich, Unverleid, Unvertritt, Vogelknoeterich, Wegetritt, Weggras, Weglauf—; *Harboi Hills:* Seresh—; *Hindi:* Bannalia, Bigbund, Endrani, Hunraj, Machoti, Nisomali—; *Italian:* Centimorbia, Centinodia, Coreggiola, Sanguinaria, Sanguinella—; *Malaya:* Pin chook—; *Malta:* Common Knotgrass, Centinoda, Coreggiola, Leuza tar-raba—; *Persian:* Hazarbandak—; *Punjab:* Banduke, Kesru—; *Pushtu:* Tandulai—; *Roumanian:* Troscot—; *Russian:* Sporisch—; *Sanskrit:* Miromati, Nisomali—; *Spanish:* Centinodia, Lengua de pajaro, Pico de Gorrion, Sanguinaria mayor—; *Tasmania:* Hog Weed, Wire Weed—.

2. **Polygonum plebejum** R. Br. Prodr. (1810) 420.—PLATE 806.

A diffusely branched, prostrate herb, often with a woody rootstock; branches terete, striate. Leaves 4-17 mm. long, oblong, or linear, or obovate, sessile or shortly petiolate; stipules hyaline, short, lacerate to the middle, fimbriate. Flowers pink, axillary, solitary or 2-3 together; pedicels short or 0. Perianth 2.5 mm. long or less, divided nearly to the base; segments broad or narrow or the 2 outer (or all?) acute. Nuts 3-gonous, smooth, shining, 1-2.5 mm. long.

Distribution: Throughout tropical India and sometimes ascending the Himalaya to 7,000 ft., from Kashmir to Bhutan.—Afghanistan, tropics of Old World generally.

In Lakhimpur, the plant is dried, powdered, and taken internally in pneumonia (Carter).

The Santals use the root in bowel complaints (Campbell).

Santali: Raniphul—.

3. **Polygonum viviparum** Linn. Sp. Pl. 360.—Plate 805C.

Rootstock woody. Stem 10-30 cm. long, slender, simple. Root-leaves long-stalked, linear or linear-oblong, 2.5-15 cm. long, sharp-pointed or blunt, crenulate, leathery, sometimes hairy beneath; stem-leaves stalkless, erect. Stipules tubular, not ciliate. Flowers pink, almost erect, in spiciform racemes 2.5-10 cm. long. Bracts ovate, long-pointed, membranous, open, not tubular nor truncate. Perianth very variable in size, 4-5-partite, not enlarged in fruit. Stamens included or protruding. Styles 2-3, long, filiform, slender, free and included or long and united below. Stigma simple. Nut 3-angular or biconvex.

Distribution: From Kashmir to Sikkim, up to 15,000 ft.—Alpine N. and arctic Europe, Asia and America.

The plant has a bad taste.—The root is tonic, styptic; useful in affections of the chest and lungs, piles, old diarrhœa, rhinitis, vomiting, biliousness, chronic bronchitis, wounds, gripping in the abdomen (Yunani).

The root is a useful astringent and said to be applied to abscesses; a decoction may be used in gleet and leucorrhœa as an injection; makes an excellent gargle in relaxed sore-throat and spongy gums, and an excellent lotion for ulcers. Mixed with Gentian, it is given in intermittent fevers; also useful in passive hæmorrhage and diarrhœa.

Arabic: Anjabar—; *English:* Alpine Knotweed, Viviparous Bistort—; *Kashmir:* Maslun—; *Persian:* Anjagar—; *Punjab:* Anjabar, Bajir, Bilauri, Dori, Mamech, Maslun—; *Urdu:* Anjabar—.

4. **Polygonum glabrum** Willd. Sp. Pl. II (1799) 447; Wight Ic. t. 1799.—Plate 807.

Stems 0.6-1.5 m., stout, simple or slightly branched, procumbent and usually reddish below, then erect, the young stems usually green, polish, with a dark reddish brown ring at each node.

Leaves 7.5-23 by 1.6-3 cm., lanceolate, finely acuminate, glabrous, closely gland-dotted, tapering at the base; lateral nerves numerous, close slender; petioles 3-13 mm. long, those of the young leaves usually red; stipules 2.2-3.2 cm. long, those on the old stems torn and ragged, when young completely and closely sheathing the stem, conspicuously veined, the mouth truncate not ciliate. Flowers pink, in paniculate slender racemes; peduncles usually glabrous; pedicels short; bracts 4 mm. long, ovate, obtuse, with membranous not ciliate margins, few-flowered. Perianth 3-5 mm. long; segments oblong, obtuse. Stamens 6-8 (often 7). Styles 2, connate at the base, the free portions 1.5 mm. long, filiform. Nutlets 3 mm. diam., broadly ovoid or suborbicular, compressed, biconvex, black, shining.

Distribution: Throughout India, Ceylon.—China, Australasia, Africa, America.

An infusion of the leaves is used by the country people of Bombay to relieve pain in colic.

In Chota Nagpur, it is employed as a cure for "stitch in the side," and in Assam as a remedy for fever.

Assam: Bihagni, Bihlangani, Larborna, Patharua—; *Bombay:* Raktarohida—; *Santali:* Jioti, Sauriarak—; *Tamil:* Atalari—.

5. **Polygonum persicaria** Linn. Sp. Pl. 361.

An erect or ascending annual, 30-60 cm. high. Stems branched, with swollen nodes. Leaves flat, ovate, lanceolate, spotted, more or less stalkless, sharp-pointed, fringed with hairs, downy, dotted below, without glands. Stipules loose, strongly fringed with hairs. Flowers in dense racemes or spikes, compact, ovate to oblong, cylindrical, terminal and axillary, the lateral stalkless. Perianth-segments red or white, smooth (like the stalk), as a rule without glands. Stamens 5-8; outer anthers opening inwards, the inner outwards. Styles 2-3, united half-way. Fruit plano-convex or 3-angled, flattened, gibbous on one side, hardly covered by the perianth-segments.

Distribution: Kashmir.—N. and W. Asia, Africa, Europe, N. America.

It is considered astringent in Europe, and used as a vulnerary and lithontriptic.

In Norway, the juice of the plant is introduced into the cavities of decayed grinders to relieve the pain.

Catalan: Herba de la mala bua, Presseguera borda—; *English:* Common Red Persicaria, Lady's thumb, Spotted Redshank—; *French:* Curage, Fer-à-cheval, Herbier, Persicaire commune, Persicaire douce, Persicaire tachetée, Pied-rouge, Pilingre—; *German:* Angerkraut, Blutgarbe, Blutkraut, Dæhngras, Eilegras, Ferkelgras, Ferkelkraut, Flohknoeterich, Hanselamweg, Huehnrerserb, Ihlgras, Innocenzkraut, Jungferntritt, Knauel, Knoeterich, Knotengras, Knotenwegerich, Kurwell, Saugras, Saukraut, Schweinegruse, Swienegras, Taennegras, Unverleid, Unvertritt, Weglauf—; *Irish:* Gluineach dearg—; *Roumanian:* Unghia calului—; *Russian:* Pochechuinaya trava—; *Spanish:* Duraznillo, Yerba pejiguera—.

6. **Polygonum barbatum** Linn. Sp. Pl. 362.—Plate 808.

Plant about 0.9 m. tall. Leaves lanceolate or linear-lanceolate, acuminate both ends, glabrous or more or less strigose, 7.5-12.5 cm. long, 1.3 cm. across; petioles 2.5 mm. long; sheath much shorter than the long (7.5 cm.) internodes, mouth truncate, stiff, ciliate. Spiciform racemes rather thick, 3.8-5 cm. long; peduncles 2.5 cm. long or more. Bracts ciliate. Flowers 4 or more in axil of bract. Perianth white, small. Ovary trigonous; style trifid. Nutlet trigonous.

Distribution: Tropics of the Old World.

The seeds are employed in Malabar and Canara to relieve the griping pains of colic.

In Patna, the root is used as an astringent and cooling remedy.

In China, a decoction of the leaves and stalks is said to be used as a stimulating wash for ulcers.

Bengal: Bekhunjubaz—; *Chinese:* Mao Liao—; *Jashpur:* Mangarleta—; *Malayalam:* Vellutamodelamukku—; *Marathi:* Dhaktasheral—; *Mundari:* Garaara, Naiara—; *Pampangan:* Canubsuban—; *Punjab:* Narri—; *Sadani:* Sakesag—; *Sinhalese:* Ratukimbulwenna—; *Tagalog:* Subsuban—; *Tamil:* Atalari—; *Telugu:* Kondamalle, Niruganneru—.

7. **Polygonum hydropiper** Linn. Sp. Pl. 361.—Plate 805B.

Stems decumbent at base and ascending, more rarely quite erect, 30-50 cm., glabrous, very slender above, nodes below swollen. Leaves linear-lanceolate, copiously gland-dotted, 3.8-8 cm., glabrous

or scabrous on margin, subsessile, stipules glabrous, with few and usually deciduous bristles mostly under 2.5 mm. long. Flowers pink in rather lax, very slender or filiform racemes which are erect, flexuous, or decurved. Bracts glabrous, gland-dotted or not, truncate with very small, often deciduous cilia, or eciliate. Pedicels mostly exserted to the length of the flower. Perianth glandular. Styles sometimes 2 only. Nut usually trigonous, opaque, granulate, occasional ones flat.

Distribution: Plains and hills of India.—Westwards to Europe and N. Africa, temperate and subtropical Asia, Java, N. America, Australia.

The herb and the leaves are stimulant, diuretic, emmenagogue; they are used principally in Europe for obstructions of the menses, amenorrhœa, etc.

This plant possesses very acrid qualities, and is hot and biting to a degree, so that no animal will eat it and even insects avoid it; and it is said that when dried and laid amongst clothes no moth will touch them. Its bruised leaves are still used in villages instead of a mustard poultice, and they are put into the mouth to cure toothache. It is said to be a powerful diuretic; and a water distilled from it was formerly used in some nephritic complaints.

The root is stimulating, bitter and tonic, and is used for these properties in Patna. O'Shaughnessy states that the whole plant is reputed to be a powerful diuretic, but to lose its activity on drying.

In China, the juice is used for itch, and also as a diuretic, carminative, and anthelmintic.

Annam: Rau ram nha troi, Thuy lieu—; *Bengal:* Packurmul—; *Catalan:* Pebra d'aigua—; *Chinese:* Liao, Shui Liao—; *Danish:* Vandpeber—; *Dutch:* Waterpeper—; *English:* Arsesmart, Biting Pepper, Biting Persicaria, Smartweed, Water Pepper—; *French:* Culrage, Curage, Herbe à crapaud, Mercière terrestre, Persicaire âcre, Persicaire brulante, Persicaire poivrée, Piment aquatique, Piment brulant, Piment d'eau, Poivre d'eau, Polygone, Renouée âcre, Renouée brulante—; *German:* Wasserpfeffer—; *Hungarian:* Vizi bors—; *Irish:* Gluineach teith—; *Italian:* Pepe aquatico—; *Polish:* Pieprz wodny, Rdest bialy—; *Portuguese:* Pimenta de aqua—;

Russian: Potschednaya trava—; *Spanish:* Pimienta de aqua—; *Swedish:* Bitter-blad—.

8. **Polygonum punctatum** Ham. in Don Prodr. 72.—*P. alatum* Ham. in Fl. Brit. Ind. V, 41.—*P. nepalense* Meissn. Monogr. 84.—PLATE 809 (under *P. alatum* Ham.).

A very variable plant. An erect or procumbent, hairless or sparsely hairy annual. Stems 30-60 cm. long, rooting at the nodes; branches many, ascending. Leaves 2-3.8 cm. long, ovate, sharp-pointed or blunt, entire, hairless, rarely hairy, gland-dotted, rough with small points, abruptly or gradually narrowed into a winged stalk which is sometimes eared at its base. Stipules membranous, tubular, hairy or glandular towards the base, not fringed. Flowers white, purple or red, in heads 5-13 mm. diam., usually with a stalkless involucral leaf; stalks of heads glandular-hairy near the top. Bracts flat, membranous, hairless. Perianth 4- or 5- parted, 3 mm. long. Stamens 6 or 8. Styles 2 or 3, united to near the top. Nut quite enclosed in the perianth, 3-angled, or flattened and round, finely dotted.

Distribution: Throughout the Himalaya, from Kashmir to Sikkim, 4,000—10,000 ft., Khasia Hills, 4,000—6,000 ft., W. and S. India, Ceylon.—Java, China, Japan, Afghanistan, Africa.

In Kangra, the leaves are applied to swellings (Stewart).

English: Snakeweed—; *Punjab:* Satbalon.

9. **Polygonum molle** Don Prodr. 72.—PLATE 810.

Shrubby; branches stout, terete, villous, with erect or spreading hairs. Leaves petioled elliptic-lanceolate, silkily pubescent, tomentose or villous beneath. Flowers white, in large terminal thyrsoid tomentose panicles, perianth 2 mm. diam., segments oblong, nut included in the usually baccate perianth.

Distribution: Central and E. Himalaya, Mishmi Hills.

The plant is used as an astringent.

Lepcha: Kandyeopam—; *Nepal:* Patuswa, Thotne, Totnye, Tuknu—.

10. **Polygonum chinense** Linn. Sp. Pl. (1753) 363.

Climber over bushes, about 2 m. long. Leaves stiff, ovate acute, base truncate or round, sometimes cordate, glabrous, nerves conspicuous, 12.5 cm. long, 7.5 cm. wide; petioles 1 cm. long with round auricles at base; sheath 1.3 cm. long. Inflorescence of panicled cymes 2.5-7.5 cm. long with leafy bracts. Flowers few in small clusters, 2.5 mm. through, white or pink. Stamens 7-8, in 2 whorls. Ovary trigonous; style trifid above. Nutlet trigonous, pulpy, black.

Distribution: India, Malay Peninsula.—Malay Islands, China, Japan.

It has tonic, vulnerary, and antiscorbutic properties.

Chinese: She Chien Ts'ao—; *Garhwal:* Ameta—; *Nepal:* Kakurthotne—.

11. **Polygonum orientale** Linn. Sp. Pl. 362.

An erect, tall, branching annual, 0.9-3 m. high, usually softly hairy or silky. Stems robust, grooved, branches hollow. Leaves 15-23 by 6.3-12.5 cm., ovate or ovate-cordate, long-pointed; stalks 2.5-10 cm. long. Stipules short, truncate hairy, ciliate at the mouth, expanded or tightly embracing the stem. Flowers red or white, in dense, erect or drooping racemes 5-10 cm. long, forming terminal panicles. Bracts flat, ovate, densely hairy, each containing 3-6 flowers. Perianth 4- or 5- parted. Stamens 7-8, included. Styles 2, united for half their length. Nutlets 3 mm. long round, flattened with rounded margins and rather concave faces, black and shining when ripe.

Distribution: Himalaya, from Kashmir eastwards, Bengal, Assam, Burma.—Turkestan, Siam, China, Japan, Java, Borneo.

It is a good tonic and vulnerary.

Chinese: Hung Ts'ao—; *French:* Bâton de saint Jean, Cordon de cardinal, Monte au ciel, Renouée d'Orient, Grande Persicaire, Persicaire du Levant—; *Italian:* Codine rosse—.

12. **Polygonum virginianum** Linn. Sp. Pl. 360.

A perennial herb. Stems 1.5 m. and higher, sparsely hairy; branches hollow. Leaves 10-25 cm. long, short-stalked, elliptic or elliptic-lanceolate, thin, nerves many, slender; stalk 1.3-2.5 cm.

Stipules 6-13 mm. long, tubular, hairy, mouth truncate and ciliate. Racemes long-stalked, very long and slender. Bracts 6-25 mm. long, distant, 2-fid, 2-flowered. Flower-stalks 4 mm. long, rigid, stout in fruit. Perianth without glands, thin, 4-partite. Stamens 5, alternating with glands. Styles 2, long, rigid, hooked, persistent, free to the base. Nut ellipsoid, flattened, pale brown, as long as the styles.

Distribution: Temperate Himalaya, from Kashmir to Sikkim.—China, Japan, E. United States.

It is demulcent, pectoral, astringent, tonic and diuretic.

Chinese: Chin Szu Ts'ao, Hai Ken—.

13. **Polygonum sphaerostachyum** Meissn. Monog. Polyg. 53.—*P. macrophyllum* Don Prodr. 70.

Root-leaves long-petioled, linear or linear-oblong, acute or obtuse, crenulate, base acute or obtuse. Spikes solitary, erect, stout, cylindric or capitate, very dense-flowered. Flowers crimson, drooping.

The dense spike of brilliantly coloured drooping flowers is the best character for this beautiful plant.

Distribution: Temperate and subalpine Himalaya, 11,000—15,000 ft.

It is a good astringent.

14. **Polygonum serrulatum** Lagasca Gen. et Sp. Nov. 14.

Stems 0.6-1.2 m. high, slender, smooth, often reddish. Leaves almost stalkless, drying green, 7.5-12.5 by 1-1.5 cm., linear, sharp-pointed, smooth or with a few scattered hairs on the upper side and the midrib, the margins usually ciliate, base slightly tapering, rounded. Stipules up to 3.8 cm. long, hairy, the mouth truncate and ciliate with long stiff bristles which are nearly as long as the tube. Flowers in slender, erect racemes, 2-5 cm. long which form panicles, pedicels short. Bracts membranous, smooth, strongly ciliate with long hairs, the margins somewhat rose-coloured. Perianth white, 2.5 mm. long, without glands; segments ovate. Stamens 5-8. Styles 3, united at the base, the free portion filiform. Nuts 2 mm. long, 3-angled, smooth and polished.

Distribution: From the Indus in the W. Himalaya to Bengal, Assam and Burma, Central and S. India, Ceylon, Malay Peninsula, China, Australia, W. Asia, S. Europe, Africa, America.

The Zulus apply a paste of the leaves to sores. The Chinese apply it to the bites of insects and snakes.

South Africa: Knotweed—.

FAGOPYRUM Tourn. ex Hall.

Erect herbs. Leaves deltoid, hastately deltoid, or cordate. Flowers in terminal or axillary cymes. Perianth 5-partite; segments subequal, not enlarged in fruit. Stamens 8, alternating with glandular disk-lobes. Ovary 3-gonous; styles 3, stigmas capitate. Nut much longer than the perianth, 3-gonous. Cotyledons very broad, twisted, or rolled round the ascending radicle.—Species 4.—Asia.

A. Annual
  1. Nut 6-8 mm. long, pale .... 2. *F. esculentum.*
  2. Nut 4 mm. long, opaque .... 3. *F. tataricum.*
B. Perennial .... 1. *F. cymosum.*

F. cymosum Meisn., *F. esculentum* Moench., *F. tataricum* Gaertn. are used medicinally in China; *F. esculentum* Moench. in Europe.

1. **Fagopyrum cymosum** Meissn. in Wall Pl. As. Rar. III, 63.—*P. cymosum* Treviran. Delect. Sem. Hort. Vratisl. 1824.

A pubescent, erect, branching herb, 0.3-0.9 m. Leaves long-stalked, entire, broadly triangular, 5-10 cm. across, acutely pointed, cordate, the uppermost narrower and stem-clasping; stipules tubular. Flowers 2-sexual, small, white, in racemes 5-12.5 cm. long forming long-stalked panicles; flower-stalks jointed near the middle. Perianth 5-parted; segments nearly equal, blunt. Stamens 8, alternating with honey-secreting glands. Styles 3, long, free; stigmas capitate. Nut ovate, acutely 3-cornered, more than twice as long as the perianth enclosing its base.

Distribution: Temperate Himalaya, 5,000—11,000 ft., Khasia Hills, 4,000—5,000 ft.—Yunnan.

The grains are recommended as a diet in colic, choleraic diarrhœa, fluxes of all kinds, and abdominal obstructions.

Chinese: Ch'ih Ti Li—; *Punjab:* Banogal—.

2. **Fagopyrum esculentum** Moench Méthod. 290.

Annual, glabrous; stem 30-90 cm. long. Leaves 2.5-10 cm. diam. (12.5 in very large specimens), triangular-cordate, acute. Flowers pink or white in axillary and terminal peduncled subcapitate many-flowered cymes, 13-20 mm. diam. Nut 6-8 mm. long, pale, ovate, angles acute.

Distribution: Central Europe and N. Asia; cultivated in the Khasia Mts., throughout the Himalaya and W. Tibet at elevations of 2,000—12,000 ft., and in the Nilgiris.

The flour from the seeds is used in Spain, as an emollient and resolvent.

The grains are used in China in the same way as those of *F. cymosum.*

Assam: Doron—; *Bhutia:* Bhe, Palti—; *Cantonese:* San K'iu mak—; *Catalan:* Blat negre, Fajol, Fayol—; *Chinese:* Ch'iao Mai, Hsin Ch'iao Mai—; *Darjeeling:* Titaphapur—; *Dutch:* Boekweit—; *English:* Brank, Buckwheat—; *French:* Blé de Barbarie, Blé martin, Blé noir, Blé rouge, Carabin, Dragées de cheval, Mil des Maures, Sarrazin—; *Garhwal:* Kotu—; *German:* Buckweizen—; *Hindi:* Kotu, Kultu, Phaphra—; *Hova:* Varimbazahamainty—; *Italian:* Faggina—; *Kangra:* Bareskatu—; *Kashmir:* Trambashirin—; *Kullu:* Bres, Kathu—; *Kumaon:* Ogul, Phaphar—; *Languedoc:* Blad negro—; *Malaya:* Sin Khiew mak—; *Nepal:* Titaphapur—; *Portuguese:* Trigo mourisco—; *Punjab:* Daran, Obal, Ogal, Phaphar, Phulan—; *Roumanian:* Hrista—; *Russian:* Grecha, Grechiha—; *Simla:* Dhanphari, Kathu, Pagua, Phaphra, Ugla—; *Spanish:* Alforfon, Trigo negro, Trigo sarraceno—.

3. **Fagopyrum tataricum** Gaertn. Fr. II, 182, t. 119, fig. 6. —*Polygonum tataricum* Linn.; Meissn. Monogr. Polyg. 62, t. 4, 8.

Annual, glabrous; stem 60-90 cm., usually simple. Leaves 2.5-5 cm. diam., very broadly triangular- cordate or hastate. Flowers white or pink, in axillary and terminal peduncled subcapitate cymes. Nut 4 mm. long, conico-ovoid, opaque, rounded; with 3 deep grooves and rounded angles; angles keeled towards the tip.

Distribution: N. Europe and N. Asia, cultivated throughout the Himalaya at 3,000—12,000 ft.

The plant is considered slightly poisonous by the Chinese. The bark is used for its astringent properties.

Chinese: Ku Ch'iao Mai—; *English:* Bitter Buckwheat—; *French:* Blé de Tartarie, Granette, Sarrazin de Tartarie—; *Hindi:* Kaspat—; *Ladak:* Rjao, Trao—; *Punjab:* Brapu, Chin, Drawo, Kalatrumba, Karmabres, Kathu, Katu, Phaphra, Tsabri, Ugal, Ulgo—.

RHEUM Linn.

Stout herbs with woody large roots. Leaves large, entire toothed or lobed; stipules scarious. Flowers clustered in panicled racemes usually 2-sexual. Sepals 5. Stamens 6-9. Ovary 2-4-angled; styles 2-4, stigmas dilated capitate or horseshoe-shaped. Nut 2-4-winged, very much larger than the usually unchanged sepals. Embryo straight, cotyledons broad.—Species 20.—Temperate and subtropical Asia.

A. Stemless. Flowers in spike-like raceme .... 1. *R. spiciforme.*
B. Stem branched and panicle leafy
   1. Flowers dark purple .... 2. *R. emodi.*
   2. Flowers pale yellowish .... 3. *R. webbianum.*
C. Stem simple. Panicles axillary concealed by bullate bracts .. 4. *R. nobile.*

Bitter, astringent, tonic, purgative.

The following species are used medicinally in Europe—*R. campactum* Linn., *R. undulatum* Linn.—; In Syria and Persia—*R. ribes* Linn.—; in China—*R. officinale* Baill.—; in Malaya—*R. officinale* Baill., *R. palmatum* Linn.—.

Chrysarobic acid and rheonilic acid have been obtained from *R. compactum* Linn., *R. emodi* Wall., *R. palmatum* Linn., *R. undulatum* Linn.

OFFICIAL :—The root of *Rheum spp.* and *R. officinale* Baillon in Portugal.

The rhizome of *Rheum spp.* (Austria, Great Britain, Holland, Norway, Spain, Sweden, Switzerland, Turkey), *R. officinale* H. Bn. (Belgium, France), *R. officinale* Baillon (Austria, Denmark, Great Britain, Hungary, Italy, Russia, Spain, Switzerland), *R. palmatum*

Linn. (Austria, Denmark, Hungary, Italy, Russia, Sweden, Switzerland), *R. palmatum* Linn. var. *tanguticum* Maximowicz (Belgium, Germany, Spain, Turkey), *R. tanguticum* Tschirch. (Japan), *R. undulatum* Linn. (Italy).

The root and rhizome of *Rheum spp.* (France, United States), *R. officinale* Baillon (United States), *R. palmatum* Linn. (United States), *P. rhaponticum* Linn. (France).

1. **Rheum spiciforme** Royle Ill. 318, t. 78.—PLATE 811A.

Root short or long, thicker than the thumb. Leaves all radical, 15-30 cm. diam., thickly coriaceous, orbicular, broadly ovate or cordate, glabrous or stellately puberulous beneath, very leathery, with prominent radiating nerves and reticulated nervules beneath, red-brown in age; petiole 7.5-15 cm., very stout, glabrous or puberulous. Racemes 1-3, glabrous, radical, 10-30 cm. strict, dense-flowered; peduncle and rhachis stout, glabrous; bracts minute, ovate, scarious; flowers 2.5 mm. diam., on capillary pedicels. Fruit broadly ellipsoid or oblong, 8-13 mm. long, 3-4 times as long as the oblong obtuse sepals, tip rounded or notched, wings broader than the disk, membranous, pedicel half as long as the fruit or less.

Distribution: W. Himalaya, 9,000—14,000 ft.—Afghanistan.

The root is purgative.

Afghanistan: Chukri, Rawash—; *Garhwal:* Archu—; *Ladak:* Lachu—; *Spiti:* Lachu—.

2. **Rheum emodi** Wall. Cat. 1727.—PLATE 813B.

Root very stout; stem leafy, very stout, 1.5-1.8 m. high, streaked green and brown. Radical leaves long-petioled, very large, often 60 cm. diam., orbicular or broadly ovate obtuse, base cordate 5-7-nerved, papillose beneath, subscaberulous above; petiole 30-45 cm., very stout, scaberulous. Panicle 0.6-0.9 m., papillosely puberulous, fastigiately branched and leafy, with erect strict branches; flowers 3 mm. diam., dark purple. Fruit ovoid-oblong, 13 mm. long, purple, base cordate, apex notched, wings narrower than the disk.

Distribution: Subalpine and alpine Himalaya, 11,000—12,000 ft.

The tuber is pungent, bitter; tonic, laxative; useful in dysentery, loss of appetite, bad ulcers (Ayurveda).

The root has a sharp bitter taste; alexiteric, purgative, emmenagogue, diuretic; useful in biliousness, lumbago, heating of the brain, sore eyes, piles, chronic bronchitis, chronic fever, asthma, coryza, pains, bruises (Yunani).

The root is used as a purgative and astringent tonic.

Tumminkatti and Ghouse Mohiyuddin have examined the rhizomes chemically (20th Ind Sc. Congress; Patna, 1933).

Afghanistan: Chukri, Rawash—; *Arabic:* Ravandehindi, Rawind—; *Bengal:* Banglarevanchini—; *Bombay:* Ladakirevandachini—; *Canarese:* Natrevalchinni, Natrevvachinni—; *Deccan:* Natkirevanchini—; *Garhwal:* Archu—; *Gujerati:* Gamnirevanchini—; *Hindi:* Dolu, Hindirevandchini—; *Ladak:* Lachu—; *Marathi:* Mulkacharevalchinni, Revachini—; *Nepal:* Padamchal—; *Persian:* Bikhrewas, Revandehindi—; *Punjab:* Arts, Artso, Atsu, Chotial, Chuchi, Chukri, Chutial, Kandaul, Khabiun, Lachu, Pambash, Rewandchini, Ribas—; *Sanskrit:* Gandhini, Pita, Pitimulika, Revatchini—; *Spiti:* Lachu—; *Tamil:* Nattirevalchinni, Nattumanjatchinnakkilangu—; *Telugu:* Nattupampuchinagadda, Natturevalchinni—; *Urdu:* Rewanchini—.

3. **Rheum webbianum** Royle Ill. 318, t. 17a.—Plate 811B.

Very variable in size, from 0.3-1.8 m. high, stem leafy, with leaves 10-60 cm. diam., long-petioled, orbicular-cordate or reniform, 5-7-nerved, papillose or glabrous, tip rounded or subacute. Panicles axillary and terminal, quite glabrous. Flowers pale yellowish, very much smaller than in *R. emodi,* the panicle less strict and quite glabrous. Fruit broadly oblong or orbicular, 8 mm. diam., notched at both ends, with wings like those of *R. spiciforme.*

Distribution: Central and W. alpine Himalaya, 10,000—14,000 ft.

The root is laxative.

Garhwal: Archu—; *Ladak:* Lachu—; *Nepal:* Padamchal—; *Spiti:* Lachu—.

4. **Rheum nobile** Hook. f. & Th. Ill. Himal. Pl. t. 19.

Root very long, 7.5 cm. diam., and under. Stem simple, 90-120 cm., as thick as the wrist below, deeply grooved, densely clothed with reflexed inflated imbricating (downwards) bladder-like reticulated bracts which conceal the short axillary panicles. Leaves ovate-oblong or rounded, very coriaceous, 30 cm. diam. and under, usually edged with red, upper passing into the bracts, base of leaves cuneate or cordate; petiole 5-15 cm., stout, stipules voluminous, 15-20 by 10-15 cm., rose-red. Bracts orbicular, 15 cm. diam., pale straw-coloured, reticulate, deciduous in age. Panicles 7.5-10 cm., branched, glabrous; and flowers crowded, 2.5 mm. diam., green. Fruit 6 mm. long, broadly ovoid, 2-4-winged, disk tuberculate.

Distribution: Interior ranges of Sikkim Himalaya, 13,000—15,000 ft.

The root is therapeutically the same as that of *R. emodi* (Ayurveda, Yunani).

The root resembles that of medicinal rhubarb, but is spongy and inert (Hooker).

Sikkim: Tchuka—.

Oxyria Hill.

An erect herb, with stout rootstock. Leaves chiefly radical, orbicular-cordate or reniform; stipules broad, lax. Flowers in panicled racemes, 2-sexual. Sepals 4, 2 outer reflexed; 2 inner larger, erect, appressed. Stamens 6, ovary compressed; styles 2, short, stigmas fimbriate. Nut biconvex, 2-winged. Embryo lateral, nearly straight, cotyledons linear-oblong.—Species 1.—N arctic and subarctic.

1. **Oxyria digyna** Hill Hort. Kew. 158.—Plate 814.

Glabrous, fleshy. Rootstock tufted, with many erect succulent stems 10-45 cm. high. Leaves radical, many, long-petioled, 2.5-10 cm. diam., cordate or reniform, rarely 3-lobed or subhastate, cauline 1-2; petiole sometimes 20 cm. Racemes slender, lax-flowered; pedicels jointed in the middle, tip thickened. Outer sepals spreading or

reflexed; inner spathulate, 3-5-nerved. Fruit 4-6 mm. diam., orbicular-cordate, wing membranous veined top notched.

Distribution: Alpine Himalaya from Kashmir to Sikkim, 10,000—17,500 ft.—Mountains of Europe, N. Asia, and America, arctic regions.

In Chumba and Kanawar, it is known as a refrigerant.
English: Mountain Sorrel—; *Punjab:* Amlu, Chohahak—.

Rumex Linn.

Perennial or annual herbs (rarely shrubs). Leaves mostly radical or cauline, alternate; stipules hyaline, ocreate, often disappearing in age. Flowers hermaphrodite or monoecious, in axillary clusters or in whorls, arranged in simple or panicled racemes; pedicels jointed; bracts ocreate; bracteoles 0. Perianth-segments 6 (rarely 4), the inner accrescent, entire or toothed; the midrib or disk often enlarged or tuberculate. Stamens 6; filaments short; anthers oblong. Ovary 3-gonous; ovule solitary; styles 3; stigmas fimbriate. Fruit a small nut enclosed in the usually enlarged inner perianth-segments, the angles acute. Seed erect; embryo lateral, nearly straight; cotyledons linear or oblong.—Species about 100.—Especially N. temperate.

A. Flowers bisexual. Styles terminal. Inner sepals coriaceous much enlarged in fruit. Leaves not hastate
- I. Inner fruiting sepals with very narrow margins .... 1. *R. maritimus.*
- II. Inner fruiting sepals with broad much-toothed wings
  - a. Wings irregularly toother, teeth stout straight ...... 2. *R. dentatus.*
  - b. Wings pectinately toothed, teeth usually hooked at the tip .... 3. *R. nepalensis.*

B. Flowers unisexual or polygamous, inner sepals much enlarged, membranous, entire, midrib with a deflexed tubercle near its base, leaves hastate
- I. Polygamous .... 7. *R. scutatus.*
- II. Dioecious .... 6. *R. acetosa.*
- III. Monoecious .... 4. *R. vesicarious.*

C. Flowers diœcious, inner sepals herbaceous, hardly enlarged in fruit. Leaves hastate .... 5. *R. acetosella.*

The root is tonic, astringent, antiscorbutic, refrigerant, anthelmintic, slightly aperient and diuretic.

The following species are used medicinally in Europe—*R. acetosa* Linn., *R. acetosella* Linn., *R. acutus* Linn., *R. alpinus* Linn., *R. aquaticus* Linn., *R. conglomeratus* Murr., *R. hydrolapathum* Huds., *R. obtusifolius* Linn., *R. patientia* Linn., *R. sanguineus* Linn., *R. scutatus* Linn., *R. sylvestris* Wallr—; in China—*R. acetosa* Linn., *R. crispus* Linn.—; in Annam—*R. hydrolapathum* Huds.—; in Abyssinia— *R. abyssinicus* Jacq.—; in South Africa—*R. acetosa* Linn., *R. acetosella* Linn., *R. crispus* Linn., *R. ecklonianus* Meissn., *R. nepalensis* Spreng., *R. woodii* N. E. Br.—; in Madagascar—*R. nepalensis* Spreng.—; in La Reunion—*R. patientia* Linn.—in North America—*R. aquaticus* Linn., *R. conglomeratus* Murr., *R. crispus* Linn., *R. patientia* Linn., *R. sanguineus* Linn.—; in Mexico—*R. hymenosepalus* Torr.—.

The seeds of several species of RUMEX are used as antidysenteric remedies in South Africa.

1. **Rumex maritimus** Linn. Sp. Pl. 335.—PLATE 815B.

Annual; stem 0.3-1.2 m., angled and deeply grooved. Leaves 7.5-25 cm., lanceolate, base always narrowed into the petiole. Whorls of flowers lax or dense, many- or few- flowered; panicle leafy to the top; values rhombic- or oblong- ovate with a lanceolate tip, all with an oblong tubercle unarmed or with 2-3 long needle-like spines. Fruiting perianths all unarmed, or, on the same plant, some armed and some unarmed, yellow-brown when ripe, tubercle smooth, with a narrow sometimes reticulate margin; spine sometimes 4 times as long as the valve, tip straight or slightly hooked.—The fruit varies greatly in size and number and length of the spines or the valves.

Distribution: Marshes of Assam, Sylhet, Cachar and Bengal.—Europe, Asia, N. Africa, N. & S. America.

The seeds are tasteless or have a bad taste; tonic to the loins; remove pain from the back and the lumber region; cure gleet; aphrodisiac (Yunani).

The plant is a good refrigerant.

The leaves are applied to burns, and the seeds are used as an aphrodisiac.

Bengal: Bunpalung—; *English:* Golden Dock, Small Water Dock—; *Hindi:* Janglipalak, Julpalam—; *Punjab:* Bijband, Hulaobul, Junglipalak, Khattikan, Zagukei—; *Urdu:* Bijaband—.

2. **Rumex dentatus** Linn. Mant. II (1771) 226.—PLATE 816.

An erect annual 30-60 cm. high; stems usually red, grooved, glabrous. Leaves 7.5-10 by 2.5-3.2 cm., oblong, obtuse, glabrous, the petioles of the radical leaves reaching 6.3 cm. long, base rounded or cordate. Flowers pedicellate, in distinct whorls which are leafy or not. Perianth 3-5 mm. long; inner segments broadly ovate, much enlarged in fruit, reticulately veined, with an ovoid-oblong smooth tubercle at back and irregularly toothed or pectinate margins, the teeth numerous, straight, not hooked. Nut 2.5 by 1.5 mm., acutely trigonous (almost winged).

Distribution: Sind, Khandesh, S. M. Country, S. India, Kumaon, N.-W. India.—China.

The root is used as an astringent application in cutaneous disorders.

3. **Rumex nepalensis** Spreng. Syst. II, 159; Wight Ic. t. 1810.—PLATE 817.

Stems 0.45-1.2 m., robust; branches stiff, spreading. Leaves entire, pointed; lower ones long-stalked, oblong-ovate, 15 by 7.5 cm. or larger, cordate; upper nearly sessile, smaller, narrowed to the base; uppermost sessile, lanceolate. Flowers 2-sexual, in whorls forming long, nearly leafless racemes. Fruiting sepals broadly ovate, fringed with comb-like, hooked teeth, the midvein of one thickened and forming an oblong tubercle.

Distribution: Temperate Himalaya, 4,000—12,000 ft., W. Ghats, Nilgiris and Pulney Hills.

The tuberous roots are used as a substitute for rhubarb in Bengal.

In Madagascar, an infusion of the leaves is given in colic and applied to syphilitic ulcers.

A strong decoction of the leaves is used by Europeans in the Transvaal, in tablespoonful doses three times a day by the mouth, for bilharziasis. It is said to be effective.

The Sutos prepare a medicine for newly confined women from the plant.

The chemical composition of the root has been determined (*Journ. Chem. Soc.;* 1896, 1900).

Antsianaka: Lelanangaka, Molotrankaga, Tabebaka—; *Betsileo:* Lavaravina—; *Hova:* Famelomana—; *Menabe:* Avovina—; *Suto:* Kxamane-e-Kxolo, Molokodi, Pota-ka-leleme—.

4. **Rumex vesicarius** Linn. Sp. Pl. 336.—PLATE 815A.

Annual, monoecious, glabrous, branched from the root, rather fleshy, pale green, 15-30 cm. high, dichotomously branched. Leaves 2.5-7.5 cm., obtuse or acute, elliptic ovate or oblong, 3-5-nerved, base cuneate rarely cordate or hastate, petiole as long as the blade. Racemes 2.5-3.8 cm., terminal and leaf-opposed, leafless; pedicels slender, jointed about the middle or unjointed. Flowers sometimes 2-nate and connate, valves large, orbicular, 2-lobed at each end, very membranous and reticulate without a marginal nerve. Fruit 1.3 cm. diam., white or pink, valves hyaline.

Distribution: W. Punjab, Trans-Indus Hills.—Afghanistan, Persia, the Levant, and N. Africa.

The herb is very sour; laxative, stomachic; useful in heart troubles, pains, tumours, constipation, alcoholism, diseases of the spleen, hiccough, flatulence, asthma, bronchitis, dyspepsia, vomiting, piles; causes biliousness (Ayurveda).

The herb is cooling; tonic, analgesic; useful in scabies, leucoderma, toothache, bites and stings of poisonous animals; checks nausea; promotes appetite (Yunani).

The leaves are cooling and aperient, and, to a certain extent, diuretic.

The juice is said to allay the pain of toothache, and by its astringent properties to check nausea, promote the appetite and allay morbid craving for unwholesome substances. It is also considered very cooling and of use in heat of stomach, and externally as an

epithem to allay pain, especially that caused by the bites or stings of reptiles and insects. The seeds are said to have similar properties, and are prescribed roasted in dysentery, and as an antidote to scorpion-stings.

The leaves are considered an antidote to snake-venom, and the seeds an antidote to scorpion-venom (Charaka). The leaves are also applied externally to the part bitten.

Neither the leaves nor the seeds have any value in the antidotal and symptomatic treatment of snake-bite (Mhaskar and Caius) or scorpion-sting (Caius and Mhaskar).

Arabic: Hamaz, Humarbostani, Humbijit—; *Assam:* Sukhasag—; *Bengal:* Chak, Chuk, Chuka, Chukapalang—; *Bombay:* Chuka—; *Burma:* Kalakhenboun;—; *Central Provinces:* Ambutchuka—; *Chagai:* Trushko, Trushpako—; *Deccan:* Ambari, Chukka—; *English:* Bladder Dock, Sorrel—; *Hindi:* Ambari, Chuka, Chukekasak—; *Kharan:* Khasako, Trushpaka—; *North Western Provinces:* Chuka, Chukapalak, Chukapalang—; *Nushki:* Turushpako—; *Persian:* Tursak, Turshah, Turshumuk—; *Punjab:* Kattamitha, Khatbiri, Khattitan, Saluni, Triwakka—; *Pushtu:* Chok, Choka, Taluni—; *Sanskrit:* Amla, Amlabhedaka, Amlanayaka, Amlankusha, Amlasara, Amlavetasa, Bhedana, Bhedi, Bhima, Bodhi, Chukra, Gulmaha, Gulmaketu, Mahakshara, Mansadravi, Phalamla, Rajamla, Raktasara, Rasamla, Sahasrajita, Sahasravedhi, Shankadravi, Shatavedhi, Varabhida, Varangi, Vedhaka, Vetasamla, Viramla—; *Sind:* Chuka—; *Sinhalese:* Suri—; *Tamil:* Shakkankirai—; *Telugu:* Chukkakura—; *Urdu:* Chukakasag—.

5. **Rumex acetosella** Linn. Sp. Pl. 538.

Perennial; glabrous, often bright red in autumn; rootstock creeping, much-branched; stem slender simple or branched from the base. Leaves 1.3-5 cm., variable in breadth and form, lower leaves petioled, lanceolate or hastate, uppermost sessile; stipules silvery, torn. Racemes erect, leafless; flowers minute, male flowers largest; pedicels jointed at the top. Fruiting sepals oblong, erect, closely appressed to the small 3-gonous fruit.

Distribution: E. Himalaya.—Europe, N. Africa, N. Asia.

The fresh plant juice is refrigerant and diaphoretic, and is used in Europe for urinary and renal troubles.

The plant has been used in the treatment of scurvy, but if eaten to excess, toxic effects from the oxalic acid may supervene.

Afrikaans: Boksuring, Steenboksuring—; *Catalan:* Agrelleta, Agreta—; *English:* Bread-and-Cheese, Cuckoo's Meat, Cuckoo's Sorrel, Field Sorrel, Lammie Sourocks, Ranty Tanty, Sheep's Sorrel, Sheep's Sourack, Sooracks, Soorocks, Souracks, Sour Docken—; *French:* Oseille des bois, Oseille de brebis, Oseille de bûcheron, Oseille des champs, Oseille de Pâques, Petite oseille, Sarcille, Sarcillett, Vinette sauvage, Petite vinette—; *Irish:* Samhadh caora—; *La Reunion:* Petite oseille—; *Roumanian:* Macrisor—; *South Africa:* Dock, Sheep Sorrel, Sour Dock—; *Spanish:* Acederilla, Vinagrerita—; *Suto:* Bodilanyana—.

6. **Rumex acetosa** Linn. Sp. Pl. 337.

Perennial, dioecious, green; root of slender fibres, from a short woody stock; stem subsimple, 30-60 cm., deeply grooved. Leaves 5-15 cm., radical leaves petioled, oblong obtuse, base cordate, hastate or sagittate, cauline sessile; petiole of lower leaves slender; stipules ragged. Racemes lax, whorls 6-8-flowered, panicle contracted; branches strict, erect, leafless; sepals of male with scarious margins; outer sepals reflexed; valves orbicular, of ripe female perianth broadly ovate-cordate, pink or crimson.

Distribution: W. Himalaya, from Kashmir to Kumaon, 8,000—12,000 ft.—N. Asia, Europe, N. America.

The leaves are refrigerant and diuretic. In Europe, they are used as a cooling drink in all febrile diseases.

In the Transvaal, a poultice of the leaves is used in treating abscesses.

The plant has been used in scurvy, and can produce oxalic acid poisoning if eaten to excess.

Afrikaans: Suring—; *Catalan:* Agrella, Vinagrebla—; *Dutch:* Zuring—; *English:* Dock Sorrel, Sorrel, Sour Dock—; *French:* Aigrette, Archille, Oseille, Oseille commune, Oseille longue, Oseille des pres, Grande oseille, Patience acide, Surelle, Vinette—;

German: Ampfer, Feldampfer, Feldjambert, Lompuch, Sauerampfer, Wiesencampher—; *Languedoc:* Agradella, Agreta, Aigreta, Eigreto—; *Portuguese:* Azeda—; *Roumanian:* Macris—; *Russian:* Shchavel—; *Spanish:* Acedera officinal, Vinagrera—.

7. **Rumex scutatus** Linn. Sp. Pl. 337.

Perennial, polygamous, papillose, somewhat glaucous; stem creeping, below branched; branches slender, 30-60 cm., flexuous, dichotomously divided, ending in long lax panicles. Leaves 2.5-5 cm. diam., all long-petioled, hastately cordate or sub-3-lobed, the lobes all broad, lateral lobes rounded suddenly contracted into the narrower midlobe. Racemes very slender, whorls 2-4-flowered, distant; flowers small; pedicels jointed about the middle, elongating in fruit; valves cordate at the base.

Distribution: W. Himalaya,—Persia, Middle and S. Europe, N. Africa.

The herb is refrigerant and astringent. It is given in dysentery in some parts of France.

Catalan: Agrella de fulla rodona—; *English:* French Sorrel—; *French:* Oseille ronde—; *Spanish:* Acedera redonda, Acedera romana—.

ARISTOLOCHIACEAE.

Herbs or shrubs often climbing, usually more or less foetid. Leaves alternate, entire or lobed; stipules 0. Flowers hermaphrodite, often large, usually lurid, terminal, axillary or lateral, solitary, racemose or cymose, bracteate or not. Perianth simple, more or less adnate below to the ovary, regular or irregular, 3-lobed or tubular; lobes valvate. Stamens 6 or more, adnate in 1 or 2 series to the top of the ovary or round the style; anthers erect with parallel cells, dehiscing dorsally. Ovary 4-6-celled; placentæ parietal, free or meeting in the axis; ovules numerous, anatropous; style columnar;

stigma lobed. Fruit capsular or baccate. Seeds numerous; albumen copious, fleshy; embryo minute.—Genera 5. Species 300.—Tropical and warm temperate, except Australia.

1. Perianth short, regular. Stamens uniseriate. Ovary linear .... BRAGANTIA.
2. Perianth tubular with an inflated base, irregular .... ARISTOLOCHIA.

Aromatic, bitter or subacrid; tonic, stimulant and diaphoretic.

Toxic principles, asarin and oil of bay, have been obtained from *Asarum canadense* Linn., *A. europaeum* Linn., and *Pimenta acris Kostel.*

Several alkaloids have been isolated: aristolochine from *A. clematitis* Linn. and *A. rotunda* Linn.; aristinic acid, aristidinic acid, and aristolic acid from *A. argentina* Griseb.

OFFICIAL :—*Aristolochia longa* Linn. (Portugal), *A. Pistolochia* Linn. (Portugal), *A. reticulata* Nuttall (Great Britain, Russia, United States), *A. rotunda* Linn. (Portugal), *A. Serpentaria* Linn. (Russia, United States), *A. Serpentaria* Linn.=*A reticulata* Nuttall (Portugal).

Asarum europaeum Linn. (Switzerland).

BRAGANTIA Lour.

Shrubs or undershrubs. Leaves petiolate, 3-5-nerved; veins closely reticulate beneath; stipules 0. Flowers in axillary cymes, bracteate. Perianth shortly campanulate, equally 3-lobed, deciduous, valvate. Stamens 6-12 (usually 9 and connate in threes opposite the perianth-segments). Ovary inferior, 4-celled; ovules numerous, 2-seriate; style short; stigmas 3 or more, linear. Capsule elongate, 4-gonous, septicidally 4-valved, the valves separating from a placentiferous column. Seeds 3-gonous, rugose or deeply pitted, often coated with the remains of the placenta; albumen fleshy, copious; embryo minute.—Species 5.—Indo-Malaya.

1. First pair of basal nerves reaching far beyond the middle of the leaf. Cymes axillary. Stamens 9-12 .... 1. *B. wallichii.*
2. First pair of basal nerves not reaching the middle of the leaf. Cymes from the base of the stem. Stamens 6 ...... 2. *B. tomentosa.*

The genus is credited with alexiteric properties.

1. **Bragantia wallichii** R. Br. in Wall. Cat. (1828) 7415; Wight Ic. t. 520.—PLATE 818.

An erect slender shrub, 1.8-3 m. high, the young parts finely pubescent; bark smooth, yellowish. Leaves distichous, 12.5-23 by 3.2-5 cm., oblong-lanceolate, acutely acuminate, entire, glabrous above, stellately pubescent and paler beneath, strongly 3-nerved from the base, with reticulate venation between the nerves, base subacute; peitoles 3 mm. long, stout. Flowers in axillary irregular few-flowered cymes; bracts small, linear, acute, pubescent; pedicels rather long, densely pubescent. Perianth 3-partite; segments broadly ovate or suborbicular, 5 mm. long, pubescent, concave. Capsules 7.5-10 cm. long, straight, obtuse, 4-gonous. Seeds acute at both ends, 3-gonous, 2.5 mm. long, deeply pitted.

Distribution: W. Peninsula, Ceylon.

The whole plant mixed with oil and reduced to an ointment is said to be very efficacious in psora or inveterate ulcers.

The root and leaves are useless as an external application in the treatment of snake-bite (Mhaskar and Caius).

A chemical examination of the roots has been carried out by Manjunath and Venkatasubbaiya (17th Ind. Sc. Congress; Allahabad, 1930).

Canarese: Mirsagni—; *Malayalam:* Alpam—; *Marathi:* Chakrani—; *Sanskrit:* Chakrani—; *Telugu:* Tellayishwari—.

2. **Bragantia tomentosa** Blume Enum. Pl. Jav. 82.—PLATE 819.

Herbaceous, low, stem simple, creeping below and rooting, then ascending, 15-30 cm. angular, geniculate, tomentose. Leaves 1-3, oblong or ovate, cordate, beneath densely tomentose, 10-15 by 6.3-10 cm., smooth but opaque above, 6-9-nerved at the base and penninerved beyond. Flowers 1.3-2 cm. diam., in simple spikes; bracts oblong, persistent. Perianth-lobes rounded-cordate, acute. Capsule 5 cm. long, straight. Seeds 3 mm. long, 3-gonous, rugose.

Distribution: Sylhet.—Java.

The Javanese use the plant as an emmenagogue.

ARISTOLOCHIA Linn.

Shrubs or perennial herbs, prostrate or twining. Leaves alternate, entire or lobed, often with a stipule-like leaf of an undeveloped bud in the axil. Perianth coloured; tube inflated below, then contracted, hairy within; limb oblique, usually 2-lipped. Stamens 6 (rarely 5 or more than 6), adnate 1-seriately above the ovary, the filaments or connectives not distinguishable from the style; anthers adnate to the column; dehiscence extrorse. Ovary inferior, more or less perfectly 6-celled (rarely 5- or 4- celled); placentæ parietal or intruded or conniving and connate in the axis; ovules many, 2-seriate; style or column short, thick, divided above into 3 or 6 (rarely more) obtuse or linear short lobes. Capsule lantern-like, septicidally 6- (rarely 5-) valved or splitting through the placentæ. Seeds usually many, horizontal, often covered by the remains of the placenta; albumen fleshy; embryo minute.—Species 250.—Tropical and temperate.

1. Leaves reniform or broadly cordate .... 1. *A. bracteata.*
2. Leaves from linear to obovate-oblong or sub-panduriform .... 2. *A. indica.*
3. Leaves large cordate, upper often narrow, subsaggitately lanceolate .... 3. *A. tagala.*

Bitter, tonic, stimulant, emmenagogue, antiseptic, odontalgic, sudorific, and anthelmintic.

The following species are used medicinally in Europe—*A. clematitis* Linn., *A. longa* Linn., *A. pallida* Willd., *A. pistolochia* Linn., *A. rotunda* Linn.—; in China—*A. debilis* Seib. & Zucc., *A. kaempferi* Willd.—; in Annam—*A. contorta* Bunge—; in Malaya—*A. debilis* Sieb & Zucc.—; in Japan—*A. kaempferi* Willd.—; in the Philippine Islands—*A. indica* Linn.—; in North America—*A. serpentaria* Linn., *A. sipho* L'Her.—; in Mexico—*A. anguicida* Jacq., *A. cymbifera* Mart. & Zucc., *A. foetida* Kunth., *A. mexicana* Kostel—; in Venezuela—*A. pandurata* Jacq.—; in Peru—*A. fragrantissima* Ruiz—; in Brazil— *A. antihysterica* Mart., *A. brasiliensis* Mart. & Zucc., *A. cymbifera* Mart., *A. galeata* Mart. & Zucc., *A. macroura* Gom., *A. rumicifolia* Mart. & Zucc., *A. theriaca* Mart.—; in Guiana—*A. glaucescens* H. B. K.—; in the West Indies—*A. anguicida* Linn., *A. cymbifera* Mart., *A. grandiflora* Aruda,

A. odoratissima Linn., *A. surinamensis* Willd., *A. trilobata* Linn.—; in West Africa—*A. albida* Duch.—; in Egypt—*A. rotunda* Linn.—; in Arabia—*A. bracteata* Retz.—.

OFFICIAL :—The root of *A. longa* Linn., *A. Pistolochia* Linn., *A. rotunda* Linn. in Portugal.

The rhizome of *A. Serpentaria* Linn. (*A. reticulata* Nuttall) in Portugal.

The rhizome and roots of *A. reticulata* Nuttall or *A. Serpentaria* Linn. in Russia, and the United States of America.

1. **Aristolochia bracteata** Retz. Obs. Bot. fasc. 5 (1789) 29.—PLATE 820A.

A slender perennial; stems 30-45 cm. long, weak, prostrate, branched, striate, glabrous. Leaves 3.8-7.5 cm. long and as broad as long, reniform or broadly ovate, usually obtuse, cordate at base with a wide shallow sinus, glaucous beneath, finely reticulately veined, glabrous; petioles 1.3-3.2 cm. long. Flowers solitary; pedicels with a large sessile orbicular or subreniform bract at the base. Perianth 2.5-4.5 cm. long, base subglobose, tube cylindric with a trumpet-shaped mouth, lip linear, dark purple, with revolute margins, finely reticulately venied, as long as the tube. Capsules 1.3-2 cm. long, oblong-ellipsoid, 12-ribbed, glabrous. Seeds 6 mm. long, deltoid with a slightly cordate base.

Distribution: Bengal, Upper Gangetic Plain, W. Peninsula, Ceylon.—Arabia, tropical Africa.

The plant is bitter; purgative, anthelmintic; useful in "vata", "kapha", fevers, painful joints; applied to sores to kill maggots (Ayurveda).

Every part of this plant is nauseously bitter, which remains long, chiefly about the throat. For a purging with gripes, two of the fresh leaves are rubbed up in a little water, and given to an adult for a dose, once in 24 hours.

It is well-known by its Hindustani name *Kira-mar*, from its *supposed anthelmintic properties*, and also probably from the fact of the expressed juice of the leaves being applied to foul and neglected ulcers, for the purpose of destroying the *larvae of insects.*

A belief in the anthelmintic virtues of the leaves is common everywhere and, in Bombay, the plant is spoken of as having a merited reputation as an antiperiodic in intermittent fevers. Emmenagogue properties are also assigned to it.

The leaves are applied to the navel to move the bowels of children, and are also given internally in combination with castor oil as a remedy for colic. The Tamils apply the leaf, bruised and mixed with castor oil, to obstinate psora.

Hove states that the root and leaf are remarkably bitter, and yield a thick yellowish juice, which is mixed with boiled milk and given in syphilis, and combined with opium is used with great success in gonorrhœa.

In Sind, the dried root, in doses of about a drachm and a half, in the form of powder or in infusion, is administered during labours to increase uterine contractions.

This plant is used by Hindu Physicians on account of its bitter purgative and anthelmintic properties. Bruised leaf mixed with castor oil is applied externally in obstinate cases of eczema of the legs of children. A decoction of the root 1 in 10 in doses of 1 to 2 ounces was given three times a day to suspected cases of roundworms followed by castor oil and was found to be generally efficacious in expelling roundworms (Koman).

The herb is not an antidote to snake-venom (Mhaskar and Caius).

Bombay: Gandhati, Kidamari—; *Canarese:* Adumuttadagida—; *Deccan:* Gandan, Gandati, Kiramar—; *Gujerati:* Kidamari—; *Hindi:* Gandan, Gandati, Kidamari, Kiramar—; *Malayalam:* Aduthinnapalai—; *Marathi:* Kidamar—; *Sanskrit:* Bhringi, Dhumapatra, Gridhrani, Gridhrapatra, Kitakaha, Kitamari, Kitari, Krimighni, Shrimalapatra, Shymabhuva, Sulabha—; *Tamil:* Aduthinnappalai—; *Telugu:* Gadaparaku, Gadide, Kadapara—; *Uriya:* Paniri—.

2. **Aristolochia indica** Linn. Sp. Pl. (1753) 960.—Plate 820B.

Shrubby, twining; stems long, slender woody at the base, grooved, glabrous. Leaves variable; in the broad form 10-12.5 by 7.5 cm.; in the narrow form 3.8-10 by 1.3-2.5 cm., from linear-oblong to obovate-oblong or subpanduriform, usually obtusely acuminate,

glabrous, entire with somewhat undulate margins, base cuneate, rounded, subtruncate or subcordate. Flowers in few-flowered axillary racemes; bracts small, ovate, acuminate, opposite the pedicels; pedicels long, thickened above. Perianth greenish white, reaching 4.5 cm. long, with globose inflated base, then bent at a right angle and suddenly narrowed into a cylindric tube with oblique trumpet-shaped mouth gradually passing into a long narrow, linear-oblong, obtuse brownish lip. Anthers 6. Style 6-lobed. Capsules 3.8-5 cm. long, oblong or globose-oblong, opening from below upwards, 6-valved, the pedicels splitting into 6 filaments. Seeds deltoid-ovate, acute, flat, winged.

Distribution: W. Peninsula, Ceylon.

The root is pungent, bitter; alexiteric; emmenagogue; useful in "tridosha", pains in the joints, bowel troubles of children (Ayurveda).

The seeds are tasteless; useful in inflammations, biliousness, dry cough, joint pains, dyspnoea of children; purgative.—The plant is good for snake-bite (Yunani).

The root, which is very bitter, is held in much esteem as a stimulant, tonic, and emmenagogue, and is employed in intermittent fevers and other affections.

In Bombay, it is chiefly prescribed in the bowel complaints of children; and in cholera it is regarded as a stimulant tonic, and is also applied externally to the abdomen.

The juice of the fresh leaves is very useful in the croup of children, by inducing vomiting, without causing any depression.

In Murshidabad, the plant is used as an abortifacient.

It is as an antidote to snake-bites, however, that it has obtained most repute, and by the early Portuguese settlers was termed *Raiz de Cobra*, from its supposed efficacy in those cases, even in the bite of the Cobra de Capello. It seems to be, however, more used by the native Madras Physicians for snake-bite than in the Deccan or Konkan.

In the Philippine Islands, the bitter nauseous root is the most popular remedy for poisonous bites and stings. It is largely used in intermittent fevers as an emmenagogue and tonic, and is given

to children for flatulence and in dyspepsia. It is recommended for all kinds of intestinal disorders.

In Tamil country, the vaidyans use this drug in malarial fevers. The juice of the leaves of the plant is said to be a specific antidote for cobra poisoning. The root is also used for the same purpose. The powdered root is given in honey for leucoderma. A decoction of the roots of this plant was given to cases of malarial fever, the result was unsatisfactory (Koman).

The root, stem, and leaves are recommended for the treatment of snake-bite (Charaka, Vagbhata, Bapat, Ainslie, Rheede, Roberts) and scorpion-sting (Charaka); but they are all useless in the antidotal and symptomatic treatment of snake-bite (Mhaskar and Caius) and scorpion-sting (Caius and Mhaskar).

The chemical examination of the roots has been carried out by Manjunath, Siddappa, and Venkatarao (20th Ind. Sc. Congress; Patna, 1933).

Arabic: Zaravandehindi—; *Bengal:* Isarmul—; *Bombay:* Kadula, Sampsum, Sapasan, Sapshi—; *Canarese:* Gopataputtitoppalu, Isvaraballi, Isvaraberu, Isvariberu—; *Cutch:* Arkmula, Ruhimula—; *Deccan:* Isharmul—; *English:* Indian Birthwort—; *French:* Aterlusi—; *Goa:* Sapus—; *Gujerati:* Arkmula, Ruhimula—; *Hindi:* Isharmul—; *Malayalam:* Eswaramulla, Garalavegam, Isvaramuli, Karukkapallu, Katalivegam, Perumarunna, Perunkilannu—; *Marathi:* Sapasan—; *Persian:* Zaravandehindi—; *Sanskrit:* Ahigandha, Arkamula, Ishvara, Ishvari, Nakuleshtha, Nakuli, Sunanda—; *Santal:* Bhedijanetet—; *Sinhalese:* Sapsanda—; *Tagalog:* Malaube, Timbangan—; *Tamil:* Adagam, Isadesatti, Isura, Isuraver, Isuramuli, Iyavari, Karudakkodi, Kirttikkodi, Neya, Perumarindu, Perumarundu, Perunkilangu, Sarsugadi, Talaichuruli—; *Telugu:* Dulagovela, Eswaramulli, Ettakalabanda, Govila, Isvara, Isvaraveru—; *Tulu:* Isaraberu—; *Urdu:* Shapesand—; *Uriya:* Gopokoroni, Phoniori—.

3. **Aristolochia tagala** Cham. in Linnaea VII (1832) 207.—*A. Roxburghiana* Klotzsch.—*A. acuminata* Roxb. (non Lam.); Wight Ic. t. 771.

An extensively climbing shrub; stems grooved, stout, glabrous. Leaves 10-22 cm. long, the upper leaves 5-7.5 cm. the

lower 7.5-12.5 cm. broad, ovate or ovate-oblong (the upper often subsagittately lanceolate), acute or acuminate, base cordate usually with a deep and norrow sinus, glabrous, reticulately veined; petioles twining, 2.5-5 cm. long. Flowers numerous, in lax puberulous racemes, most of the flowers abortive, usually only one fertile; bracts small. Perianth 5-6.3 cm. long, base globose, greenish-yellow; tube curved, mouth oblique; lip linear, straight, obtuse villous, as long as the tube. Capsules 2.5-3.8 cm. long, globose-pyriform or oblong-ellipsoid, transversely rugulose, glabrous, the pedicels usually splitting into 6 filaments in fruit. Seeds 6-10 mm. long, and as broad as long, broadly ovate-deltoid with a deep membranous wing, flattened, usually tuberculate on one face.

Distribution: Bengal, Assam, Sylhet, Burma, W. Peninsula, Ceylon.—Java, Borneo.

The plant is used in bowel complaints.

Ilocano: Taointaoin—; *Tagalog:* Aetan, Malaube, Talatalarum, Timbangan, Timbangtimbangan Ube-ube—; *Telugu:* Nallayiswari—; *Visayan:* Goan-goan, Malaube, Ube-ube—.

PIPERACEAE.

Herbs or shrubs often with swollen nodes, usually aromatic. Leaves alternate, opposite or whorled, often gland-dotted; stipules 0 or 2, connate, or adnate to the petiole. Flowers minute hermaphrodite or unisexual, in axillary or terminal catkin-like spikes subtended by a peltate bract. Perianth 0. Stamens 2-6 (rarely 7-8), hypogynous; anthers often jointed on the filaments, the cells sometimes confluent; dehiscence longitudinal. Ovary of 3-4 carpels with many ovules; less commonly ovary 1-celled with 1 ovule; ovules orthotropous; stigmas distinct on the free carples or ovary-lobes or terminal on the undivided ovary, occasionally solitary, sessile, terminal simple or penicillate. Fruit small, indehiscent in the 1-celled species or of cocci or follicles in the many-carpelled species. Seeds globose, ovoid or oblong; testa thin; albumen copious, floury; embryo enclosed

in an amniotic cavity at the end of the albumen remote from the hilum; cotyledons minute or obsolete; radicle superior.—Genera 7. Species 1150.—Tropics.

Aromatic, stimulant, sialogogue.

The three alkaloids jaboridine, piperine, and piperovatine have been isolated from various species of *Piper*.

OFFICIAL :—*Chavica officinarum* Miq. (France).

Piper angustifolium Ruiz and Pavon=*Artanthe elongata* Miquel (Portugal); *P. Cubeba* Linn. (France, Holland, Hungary)=*Cubeba officinalis* Mygind. (Hungary),—Linn. fil. (Austria, Denmark, Germany, Japan, Norway, Sweden, Switzerland, Turkey, United States) *Cubeba officinalis* Miquel (Italy, Portugal, Spain); *P. longum* Linn.=*Chavica Roxburghii* Miquel and *C. officinarum* Miquel (Portugal); *P. nigrum* Linn. (Austria, Germany, Italy, Japan, Portugal, Turkey).

PIPER Linn.

Shrubs (rarely herbs), erect or scandent, often glandular and aromatic; branches with swollen nodes. Leaves entire, often unequal-sided; stipules various. Flowers dioecious (very rarely hermaphrodite), minute, spicate, each in the axil of a bract with or without 2 lateral bracteoles; bracts peltate or cupular and adnate to the rhachis, sometimes decurrent, with or without raised margins; bracteoles when present forming low ridges on each side of the flower or connate in a semilunar form. Perianth 0. Stamens 2-4 (rarely more); filaments short; anthers 2-celled, the cells distinct. Ovary 1-celled; ovule solitary, erect; style short, conic, beaked or 0; stigmas 2-5. Fruit a small ovoid or globose 1-seeded berry. Seeds usually globose; testa thin; albumen floury within, with hardened periphery.—Species 700.—Tropics.

A. Spike solitary. Flowers dioecious. Bracts orbicular, peltate. Fruit very small in dense cylindric rarely globose spikes
  I. Leaves quite glabrous (sometimes slightly pubescent in *p. sylvaticum*)
    a. Lower leaves long-petioled ovate-cordate, upper narrower, oblong-cordate, sessile, amplexicaul ...... 1. *P. longum*.

b. Leaves very short-petioled, rather coriaceous, oblong ovate or -lanceolate, acuminate, 3-5-nerved at the base	2. *P. chaba.*
c. Leaves membranous, long-petioled, broadly ovate, or ovate-cordate, acuminate	3 . *P. sylvaticum.*
d. Leaves large coriaceous petioled, obliquely ovate-oblong or rounded ovate-cordate	4. *P. betle.*
e. Leaves thin, dark green, ovate, deeply equally cordate, lobes round, nerves 7 radiating from the base	7. *P. sarmentosum.*
II. Leaves more or less pubescent	8. *P. aurantiacum.*
B. Spikes solitary. Flowers dioecious, rarely polygamous. Fruits forming loosely interrupted spikes. Fruits and stigma sessile	
I. Leaves 5-9-nerved	5. *P. nigrum.*
II. Leaves 7-nerved from near the base	6. *P. attenuatum.*

The genus is an energetic stimulant, diaphoretic and carminative.

The following species are used medicinally in China—*P. aurantiacum* Wall., *P. betle* Linn., *P. cubeba* Linn. fil., *P. longum* Linn., *P. nigrum* Linn.—; in the Philippine Islands—*P. betle* Linn., *P. nigrum* Linn.—; in Malaya—*P. longum* Linn., *P. nigrum* Linn.—; in the Malay Archipelago—*P. betle* Linn., *P. caninum* Rumph., *P. cubeba* Linn. fil.—; in the Society, Friendly, and Sandwich Islands —*P. methysticum* Forst.—; in Venezuela—*P. anisatum* H. B. K.—; in Brazil—*P. aduncum* Linn., *P. eucalyptifolium* Rudge, *P. nigrum* Linn., *P. parthenium* Mart., *P. peltatum* Linn., *P. reticulatum* Linn., *P. subpeltatum* Willd. *P. unguiculatum* Ruiz and Pav.—; in Guiana —*P. attenuatum* Ham., *P. bredemeyeri* Jacq., *P. peltatum* Linn., *P. plantagineum* Schlecht, *P. sarmentosum* Roxb.—; in the West Indies—*P. amalago* Mill., *P. betle* Linn., *P. reticulatum* Linn.—; in West Africa—*P. clusii* C. DC.—; in the Gold Coast—*P. guineense* C. DC. *P. umbellatum* Linn.—; in Madagascar—*P. pachyphyllum* Bak., *P. pyrifolium* Vahl., *P. subpeltatum* Willd.—; in La Reunion —*P. pyrifolium* Vahl.—; in Tanganyika Territory—*P. capense* Linn. fil.—; in the Cape of Good Hope—*P. capense* Linn. fil.—.

P. chaba Hunter, *P. geniculatum* Sw., and *P. nigrum* Linn, enter into the composition of Malayan ipohs.

Alkaloids have been isolated from several species : jaboridine, from *P. reticulatum* Linn.—; piperine from *P. chaba* Hunter, *P. clusii* C. DC., *P. longum* Linn., *P. nigrum* Linn.; and *piperovatine* from *P. ovatum* Vahl.

OFFICIAL :—The leaves of *P. angustifolium* Ruiz and Pavon (*Artanthe elongata* Miquel) in Portugal.

The fruit of *P. Cubeba* Linn. (France, Holland, Hungary)—*Cubeba officinalis* Mygind. (Hungary),—Linn. fil. (Austria, Denmark, Germany, Japan, Norway Sweden, Switzerland, Turkey, United States)—*Cubeba officinalis* Miquel (Italy, Portugal, Spain); *P. longum* Linn.—*Chavica Roxburghii* Miquel and *C. officinarum* Miquel (Portugal), *P. nigrum* Linn. (Austria, Germany, Italy, Japan, Portugal, Turkey).

1. **Piper longum** Linn. Sp. Pl. (1753) 29.—PLATE 821A.

Rootstock erect, thick, jointed, branched, stems numerous, 0.6-0.9 m., ascending or prostrate (not climbing) much-branched, stout, cylindrical, thickened above nodes, finely pubescent. Leaves numerous, 6.3-9 cm., lower ones broadly ovate, very cordate with broad rounded lobes at base, upper ones oblong-oval, cordate at base, all subacute, entire, glabrous, thin, bullate with reticulate venation sunk above and raised beneath, dark green and shining above, pale and dull beneath; petiole of lower leaves 5-7.5 cm., stout, of upper leaves very short or none; stipules about 1.3 cm., membranous, lanceolate, obtuse, soon falling. Spikes solitary, pedunculate, male slender, bracts narrow, female 1.3-2.5 cm., bracts circular, flat, peltate; stamens 2; stigmas 3 or 4, short, spreading, persistent. Fruit very small, ovoid, completely sunk in solid fleshy spike which is 2.5-3.8 cm., ovoid-oblong, erect, blunt, blackish green, shining.

Distribution: Hotter provinces of India, Ceylon, Malay Peninsula.—Malay Islands.

The root is pungent; heating, stomachic, laxative, anthelmintic, carminative; improves the appetite; useful in bronchitis, abdominal pains, diseases of the spleen, tumours, ascites; causes biliousness.—The unripe fruit is sweetish ; cooling; useful in biliousness.—The ripe fruit is sweetish, pungent; heating, stomachic, aphrodisiac, alterative, laxative, antidiarrhœic, antidysenteric; useful in "vata" and "kapha", asthma, bronchitis, abdominal complaints, fevers, leucoderma, urinary discharges, tumours, piles, diseases of the spleen, pains, inflammations, leprosy, insomnia, jaundice, hiccough, tuberculous glands; increases biliousness (Ayurveda).

The root and fruit are used in palsy, gout, lumbago.—The fruit has a bitter, hot, sharp taste; carminative, tonic to the liver, stomachic, emmenagogue, abortifacient, aphrodisiac, hæmatinic, diuretic, digestive; general tonic; useful in inflammation of the liver, pains in the joints, lumbago, snake-bite, scorpion-sting, night blindness (Yunani).

In Travancore, an infusion of the root is prescribed after parturition, with the view of causing the expulsion of the placenta. It appears to partake, in a minor degree, of the stimulant properties of the fruit.

As an alternative tonic, long pepper is recommended for use in a peculiar manner. An infusion of three long peppers is to be taken with honey on the first day, then for ten successive days the dose is to be increased by three peppers every day, so that on the tenth day the patient will take thirty at one dose. Then the dose is to be gradually reduced by three daily, and finally the medicine is to be omitted. Thus administered, it is said to act as a valuable alterative tonic in paraplegia, chronic cough, enlargements of the spleen and other abdominal viscera. Long pepper enters into the composition of several irritating snuffs; boiled with ginger, mustard oil, buttermilk and curds it forms a liniment used in sciatica and paralysis. In the Konkan, the roasted aments are beaten up with honey and given in rheumatism; they are also given powdered with black pepper and rock salt (two parts of long pepper, three of black, and one of salt) in half tola doses in colic.

The dried immature fruit and the root in the form of decoction were extensively used in acute and chronic bronchitis attended with cough and were found to give gradual relief in all such cases (Koman).

The root and the fruit are useless in the antidotal and symptomatic treatment of snake-bite. They are also useless as a collyrium, an errhine, and an external application to the part bitten (Mhaskar and Caius). Neither is an antidote to scorpion-venom (Caius and Mhaskar).

Arabic: Darfilfil—; *Bengal:* Piplamor, Piplamul, Pipli, Pipul—; *Bombay:* Bangalipimpali, Piplamul, Pipli—; *Burma:* Peikchin,

Peikkhyen, Pezinngoun—; *Canarese:* Hippali, Hippaliballi, Kuna, Tippali—; *Chinese:* Pi Po—; *Deccan:* Pipplie, Pipulmul—; *English:* Long Pepper—; *French:* Poivre long—; *German:* Langer Pfeffer—; *Greek:* Peperi makron—; *Gujerati:* Piper, Pipli—; *Hindi:* Gazpipal, Pipal, Pipar, Piplamul, Pipli, Pipulmul—; *Italian:* Pepe lungo—; *Java:* Chabijawa—; *Lepcha:* Kantin—; *Malaya:* Pit poot—; *Malayalam:* Chapala, Kana, Kattutipali, Magadhi, Pippali, Tippali—; *Marathi:* Pimpli—; *Mexican:* Tlathancuaye—; *Nepal:* Pipal, Piplamol, Popal—; *Persian:* Filfilidaraz, Filfildray, Maghzpipal, Pilpil, Pipal—; *Portuguese:* Pimenta longa—; *Punjab:* Darfilfil, Filfildaraz, Maghzpipal, Pipal, Piplamul—; *Sanskrit:* Chanchala, Chapala, Dantakapha, Eranda Gonamika, Granthika, Kagophale, Kana, Kati, Katubija, Kola, Kolya, Korangi, Krikala, Krishna, Krishnapippali, Magadha, Magadhi, Magadhodbhava, Pippali, Shaundi, Shyama, Sukshmatandula, Tiktatandula, Trikana, Upakulya, Ushana, Vaidehi—; *Santal:* Ralli—; *Sind:* Filfildray, Tippili—; *Sinhalese:* Tippili—; *Spanish:* Pimentera larga—; *Tamil:* Argadi, Atti, Kalidi, Kalini, Kaman, Kanna, Kattuttippilikkodi, Kindigam, Kirandigam, Kolagam, Magadai, Magadi, Pippili, Sabala, Sadi, Salani, Salini, Samilagi, Sanjalai, Savundi, Sayini, Sirumulagam, Sirumulam, Tippili, Tirandigam, Tunavi, Ulagulam, Vayavetti—; *Telugu:* Modi, Pippali, Pippallu—; *Tulu:* Ippali—; *Urdu:* Pipul—; *Uriya:* Baihehi, Krykola, Mogodha, Pippoli—.

2. **Piper chaba** Hunter in As. Res. IX, 391 (non Blume).—PLATE 822.

A climbing glabrous pepper, rather fleshy. Leaves oblong, ovate or lanceolate acuminate, base round unequal, cordate; nerves at base 3, with 2 pairs from midrib, 12.5-18 cm. long, 6.3-7 cm. wide; petioles 6-13 mm. long. Peduncles 13-25 mm. long. Fruiting spikes cylindro-conic, widest at base, bright red, 2.5-7.5 cm. long, 6 mm. through. Drupes very small, globose sunk.

Distribution: Cultivated in various parts of India and the Malay Islands.

The plant may be used as a substitute for *P. longum.*—The root is alexiteric; useful in asthma, bronchitis, consumption.—The fruit is pungent; heating, anthelmintic, expectorant, carminative; improves

appetite and taste; useful in asthma, bronchitis, fever, piles, pain in the abdomen and at the anus (Ayurveda).

The fruit has stimulant and carminative properties, and is used in hæmorrhoidal affections.

Bengal: Chai, Choi, Gachha—; *Canarese:* Chavya—; *Gujerati:* Chavaka—; *Hindi:* Chab, Chavi—; *Malay:* Bakek, Chai, Chey—; *Marathi:* Chavala, Miravela—; *Sanskrit:* Chavana, Chavi, Chawika, Chavya, Gandhanakuli, Katuka, Katukapini, Kola, Kolavalli, Kolavallika, Krikara, Kutilasaptaka, Nakuli, Purandara, Tejovati, Tikshnakarikanavali, Uchhishta, Ushana, Vashira—; *Telugu:* Chaikama, Sevasu—.

3. **Piper sylvaticum** Roxb. Fl. Ind. (1832) 156.—*Chavica sylvatica* Miq. Syst. Pip. 248; Wight Ic. t. 1930.—PLATE 823.

Root perennial. Stem or rather branches creeping on the ground, or rooting on trees like Ivy, and most of the East India species of pepper; all the young parts polished. Leaves alternate, petioled, equally-cordate, obtuse, from 5-7-nerved, smooth, from 7.5-12.5 cm. long, by from 5-10 cm. broad. Petioles from 2.5-5 cm. long, grooved. Stipules interfoliaceous, etc. as in the genus. Male spikes leaf-opposed, short-peduncled, or columnar, slender. Scales 1-flowered. Corolla none. Filaments generally 4, oval, fleshy, very short. Anthers 1-celled. Ovary none. Female spikes on a different plant, leaf-opposed, short, peduncled, cylindric. Ovary oval, 1-celled, ovule single, erect, that is attached directly to the bottom of the cell.

Distribution: Upper and Lower Assam, Bengal, Burma.

The fruit is used in Bengal as a carminative.

Bengal: Paharipipal—.

4. **Piper betle** Linn. Sp. Pl. (1753) 28.—*Chavica Betle* Miq. Syst. Pip. 224; Wight Ic. t. 2926.—PLATE 824.

Stems semiwoody, climbing by many short adventitious rootlets, very stout, much thickened at nodes, young parts glabrous. Leaves large, 15-20 cm., broadly ovate, slightly cordate and often a little unequal at base, shortly acuminate, acute, entire but margin often rather undulate, usually 7-nerved, glabrous, thick, bright green and

shining on both sides, petiole 2-2.5 cm., stout. Spikes dense, cylindrical, female 2.5-5 cm., pendulous, bracts triangular-rotundate, peltate, yellow, rhachis pilose; stigmas 5 or 6, spreading stellately. Fruit sparingly produced, quite immersed in the fleshy spike (and forming nodosities there) which is about 5 cm. long and pendulous.

Distribution: Cultivated in the hotter and damper parts of India and Ceylon.—Malay Islands.

The leaf is pungent, bitter, sweetish, acrid; heating, carminative, stomachic, anthelmintic, tonic, aphrodisiac, laxative; useful in "vata", "kapha", foul smell in the mouth, ozoena, bronchitis, elephantiasis of the leg; improves appetite; should not be taken in eye diseases, leprosy, poisoning, thirst, alcoholism, asthma, loss of consciousness (Ayurveda).

The leaf has a sharp taste and good smell; improves taste and appetite; tonic to the brain, heart, liver; strengthens the teeth; lessens thirst; clears the throat; vulnerary and styptic (Yunani).

In the Konkan, the fruit is employed with honey as a remedy for cough, and in Orissa, the root is said to be used to prevent child-bearing.

The juice of the leaves is dropped into the eye in painful affections of that organ; it is also used to relieve cerebral congestion and satyriasis, and to allay thirst.

The juice of the leaves is dropped into the eye in night-blindness (B. D. Basu).

The essential oil from the leaves has been successfully used in the treatment of catarrhal disorders and as an antiseptic.

In Cambodia, the pounded fresh leaves are used in the preparation of lotions and baths for patients suffering from protracted fever, small-pox, enlarged glands, lymphangitis.

In the Philippine Islands, the leaves are eminently the cure for the diseases of children: indigestion, colic, diarrhœa, pulmonary catarrh, and laryngitis. Applied hot to the chest they are said to act as a lactagogue.

Betel or "Pan" oil cannot be recommended as an anthelmintic (Caius and Mhaskar).

The leaf is not an antidote to snake-venom (Mhaskar and Caius).

The chemistry and physiology of the leaves have been studied by Mann, Sahasrabuddhe, and Patwardhan (*Memoirs Depart. Agric. of India;* July 1913, June 1916).

Arabic: Tanbol—; *Bengal:* Pan—; *Bicol:* Mamin—; *Bombay:* Pan, Vilyadele—; *Burma:* Kun, Kunyoe, Kwan, Kwanynet, Kwonrwet—; *Cambodia:* Mluv—; *Canarese:* Ambadiyele, Chigurele, Ele, Eleballi, Nagavali, Nagawalli, Panu, Pattivilye, Tambula, Vile, Vileya, Viliya, Viliyadaballi, Villedelehambu, Vilye, Vite—; *Chinese:* Chu chiang—; *Deccan:* Pan—; *English:* Betel Leaf Vine, Betel Pepper—; *French:* Betel, Betre—; *Gujerati:* Nagurvel, Pan—; *Hindi:* Pan, Tambuli—; *Java:* Siri utan—; *Konkani:* Pan—; *Malay:* Sirih, Sirih china, Sirih hudang, Sirih malaya—; *Malayalam:* Gryashya, Nagavalli, Tambulam, Vettila, Vettilamatippu, Vitika—; *Marathi:* Pan, Videchapana—; *Pampangan:* Samat—; *Persian:* Bargetanbol, Tambol—; *Philippines:* Hojas de buyo, Poro—; *Portuguese:* Betle—; *Sanskrit:* Bhakshyapatra, Bhujangalata, Bhujangavalli, Divabhishta, Kalaskanda, Nagavalli, Nagavallika, Nagini, Parna, Parnaguhashaya, Parnalata, Phanivalli, Saptalata, Saptashira, Tambulavallari, Tambuli, Tambulivalli, Vitika—; *Sinhalese:* Balat, Bulatwel—; *Spanish:* Betel, Betel de la India, Buyo de Filipinas—; *Tagalog:* Buyo, Itmo, Mamin—; *Tamil:* Ilaikkodi, Mellilai, Nirvalli, Pachadam, Sivanagini, Sukkuli, Sulini, Tambulam, Vellilai, Vettilai, Vettilaichurul—; *Telugu:* Akumadupa, Kammeraku, Nagavali, Nagavalli, Phanirajavalli, Tamalapaku, Tamulapataku, Vitika—; *Tulu:* Bachire—; *Urdu:* Pan—; *Uriya:* Chhonchipano, Nagobolli, Pano, Tambulo—; *Visayan:* Buyo, Canisi, Itmo, Mamon—.

5. **Piper nigrum** Linn. Sp. Pl. (1753) 28.—*Piper trioicum* Roxb. Fl. Ind. I (1832) 151; Wight Ic. t. 1935.—PLATE 821B.

A stout glabrous climber; stems terete, sparingly rooting, much thickened at the nodes. Leaves coriaceous, 10-18 by 5-12.5 cm., broadly ovate, acuminate, glabrous, 5-9-nerved, the supra-basal nerves usually alternate, base usually rounded, more or less oblique; petioles 1.3-2.5 cm. long. Flowers in slightly interrupted glabrous spikes of variable length (5-15 cm.), diœcious or sometimes polygamous; bracts of the female spikes more or less adnate to the rhachis, forming a short hemispheric cup beneath the ovary; bracteoles forming a

semilunar ridge above the ovary. Stamens 2. Stigmas 2-4. Fruit globose, 6 mm. diam. or less, at first yellow, afterwards becoming red when fully ripe.

Distribution: Cultivated in the tropics generally.

The fruit is pungent, bitter; hot, anthelmintic, alterative; useful in "kapha" and "vata", asthma, pains, diseases of the throat, piles, urinary discharges, ozoena, night blindness; increases biliousness; brings on sleep and epileptic fits (Ayurveda).

The fruit has a sharp, pungent, slightly bitter taste; carminative, bechic, aphrodisiac, purgative, alexipharmic; useful in toothache, inflammation, pain in the liver and the muscles, diseases of the spleen, eructations, leucoderma, lumbago, chronic fevers, paralysis; facilitates menstruation; dries the humours of the body (Yunani).

Pepper is much employed as an aromatic stimulant in cholera, weakness following fevers, vertigo, coma; as a stomachic in dyspepsia and flatulence; as an antiperiodic in malarial fever; and as an alterative in paraplegia and arthritic diseases.

Externally it is valued for its rubefacient properties, and as a local application for relaxed sore-throat, piles, and some skin diseases.

In China, pepper is considered an energetic stimulant, diaphoretic, and carminative. It is used as a cure for dysentery in Cambodia.

Black pepper is sometimes used by Malay women as an abortifacient.

Whether administered internally or applied externally the fruit is equally useless in the treatment of snake-bite (Mhaskar and Caius) and scorpion-sting (Caius and Mhaskar).

Afghanistan: Darugarm, Daurgarm, March—; *Arabic:* Babary, Filfiluswud—; *Bengal:* Golmorich, Kalamorich, Kolukung, Muricha, Murichung, Vellajung—; *Bhote:* Spot—; *Bombay:* Kalamiri, Miri, Pandharimiri, Safedmiri—; *Brazil:* Pimenteira—; *Burma:* Nayukon, Nyayokekoung, Sayomai—; *Cambodia:* Mrech—; *Canarese:* Menasinaballi, Menasinakalu, Menasu, Ollemenasu—; *Ceylon:* Molavu—; *Chinese:* Fou Tsiao, Hou Tsiao, Hu Chiao—; *Danish:* Peper—; *Deccan:* Choca, Kalimirchi, Kalimirchingai—; *Dutch:* Peper—;

English: Black Pepper, Common Pepper, Pepper—; *French:* Poivre, Poivre noir—; *German:* Pfeffer, Schwarzer Pfeffer—; *Greek:* Peperi—; *Gujerati:* Kalamari, Kalomirich, Miri—; *Hindi:* Chocamirch, Golmirch, Gulmirch, Habush, Filfilgird, Kalimirch, Mirch, Safedmirch—; *Italian:* Pepe, Pepe nero—; *Kashmir:* Martz—; *Kathiawar:* Tikhan—; *Konkani:* Miriam—; *Malay:* Ladahitam, Ladaputeh, Ladda—; *Malayalam:* Kolakam, Kurumulaka, Maricham, Mulaku, Mulakukoti, Ushanam, Vallijam, Vellajam—; *Marathi:* Kalimirch, Mire—; *Persian:* Filfileasvad, Filfilegird, Filfilesiyah, Pilpil—; *Philippines:* Pimienta—; *Polish:* Pieprz—; *Portuguese:* Pimenta, Pimenta redonda, Pimenteira—; *Punjab:* Golmirich—; *Roumanian:* Piper—; *Russian:* Peretz—; *Sadani:* Golmaric—; *Sanskrit:* Dharmapattana, Dharmavarttana, Kaphavirodhi, Katuka, Kola, Kolaka, Krishna, Krishnamushana, Malina, Maricha, Mrishta, Pavita, Ruksha, Sarvahita, Shakanga, Shirovritta, Shudha, Shyama, Tikshna, Ushana, Vallija, Vara, Varishtha, Vellija, Venuja, Venuka, Vrittaphala, Yavanapriya, Yavaneshtha—; *Sind:* Gulmirien—; *Sinhalese:* Gammiris, Kalumiris, Miris—; *Spanish:* Pimentera del Brasil, Pimienta negra—; *Swedish:* Peppar—; *Tagalog:* Malisa, Paminta—; *Tamil:* Aguttam, Arisu, Irambivam, Kallinai, Kandanaguli, Kari, Karyam, Kolagam, Malaiyinmunivan, Marisam, Milagu, Milaguvalli, Sevviyam, Sur, Tirangal, Uchiram, Valliyam, Vellaimulagu—; *Telugu:* Marichamu, Miremu, Miriyamu, Miriyalu, Miriyalatige, Paluka, Savyamu—; *Tulu:* Eddemunji, Munji—; *Urdu:* Kalimarich—; *Uriya:* Golomoricho, Moricho—.

6. **Piper attenuatum** Ham. in Wall. Cat. 6642 B, C. D (partim); Wight Ic. t. 1933.

Apparently a rambling species not unlike P. sylvaticum. Branches stout, soft, compressed, angled and grooved when dry, flexuous, glabrous. Leaves 6.3-15 cm., often as broad as long, from finely downy to glabrous beneath, membranous, orbicular-ovate or cordate, abruptly acuminate, upper more ovate glabrous or puberulous beneath, 7-nerved from near the base; base usually equally rounded, truncate or cordate, of the upper usually acute; nerves slender; petiole 2.5-7.5 cm., rarely shorter. Male spikes slender; bracts adnate, cupular; bracteoles slender; stamens 2.4. Female spikes very slender,

lengthening in fruit to 23 cm., rhachis glabrous, except in the ciliate scars left by the fruit; ovaries ovoid; stigmas minute. Fruit globose, 4 mm. diam.

Distribution: E. tropical Himalaya, Sikkim, Bhutan, Assam, Sylhet, Khasia Mts., Nilgiris.—Java.

Macerated in water the root is an excellent diuretic.

French Guiana: Queuez a rat—.

7. **Piper sarmentosum** Roxb. Fl. Ind. ed. Carey I, 162.

Glabrous, creeping terrestrial herb about 20 cm. tall. Leaves thin, dark green, ovate, deeply equally cordate, lobes round; nerves 7 radiating from base, dark green, 7.5-9 cm. long, 3.2-7.5 cm. across; petioles 3.8 cm. long. Peduncles 1.3-2 cm. long. Spikes short, dense, blunt, white cylindric, males 4 mm. long; females about as long, thicker and up to 1.3 cm. long. Drupes minute.

Distribution: Malay Peninsula, Java.

The root is a good diuretic.

French Guiana: Queuez a rat—; *Malay:* Kadok—.

8. **Piper aurantiacum** Wall. Cat. 6658A.

A rather stout climber, of a yellowish colour when dry; stems climbing and rooting, glabrous; branches not hard or woody, glabrous. Leaves or young trailing shoots with petioles 5-7.5 cm. long; leaves on the main stem and branches 7.5-10 cm. long with petioles 2-2.5 cm., coriaceous ovate elliptic- or orbicular- ovate caudate-acuminate 5-nerved, hairy or glabrate beneath, almost shining above, base rounded or acute; nerves very slender above, strong beneath; nervules indistinct on both surfaces. Spikes 3.8-7.5 cm., drooping, peduncle of both sexes about as long as the petiole; flowers densely crowded; bracts peltate, quite glabrous, stamens 2, anthers reniform, cells confluent, dehiscing across the tip; stigmas very minute; fruiting spikes variable in length. Fruit distinctly pyramidal when young and dry, when ripe about 4 mm. diam., globose.

Distribution: Nepal, Assam.

The fruit is bitter and acrid; used as a refrigerant.

Chinese: Nan T'eng—.

CHLORANTHACEÆ.

Herbs shrubs or trees, usually aromatic. Leaves opposite, usually toothed, petioles often connate and forming a sheath; stipules small, subulate. Flowers in terminal or pseudo-axillary spikes, heads or panicles, 1-sexual (one of each sex sometimes cohering). Male flowers : Perianth 0. Stamens 1 or 3 connate, filaments very short and thick; anthers 2-celled, or the lateral when 3 are connate 1-celled. Female flowers : Perianth 0, or adnate to the ovary, with a 3-toothed limb. Ovary 1-celled; style very short linear or subclavate or 0; ovule 1, orthotropous, pendulous from the top of the cavity. Drupe small ovoid or globose. Seed pendulous, testa membranous, albumen copious fleshy; embryo minute, far from the hilum, cotyledons diverging, radicle inferior.—Genera 3. Species 35.—Tropics and subtropics.

The Order exhibits stimulant properties.

CHLORANTHUS Swartz.

Perennial herbs, or shrubs. Flowers in terminal simple or panicled spikes, connate male and female in pairs. Stamens 1, or 3 confluent; central anther 2-celled, lateral anthers 1-celled. Ovary naked; stigma subsessile, truncate.—Species 10.—E. India, E. Asia.

1. Leaves subsessile .... 1. *C. officinalis.*
2. Leaves shortly petioled .... 2. *C. brachystachys.*

C. serratus R. & S. is used medicinally in China; *C. officinalis* Bl. in the Philippine Islands and the Malay Archipelago.

1. **Chloranthus officinalis** Bl. Enum. Pl. Jav. 79; Fl. Jav. III, 10, t. 1.

Shrublet about 60 cm. tall, glabrous. Leaves elliptic-lanceolate acuminate, narrowed to base, shortly serrate, many-nerved, dark green, membranous, 12.5 cm. long, 6.3 cm. wide; petioles 6 mm. long. Peduncles slender, 5 cm. long. Spikes usually 4 or 5, slender, 3.8 cm. long. Bracts sheathing, ovate. Flowers very small, white. Stamens 3, connate by connectives. Drupe 13 mm. through, pulpy, white.

Distribution: E. Himalaya, Assam, Malay Peninsula, Andaman Islands.—Yunnan, Malay Archipelago, Philippines.

In the Philippine Islands and the Malay Archipelago, the plant is considered a very potent stimulant.

2. **Chloranthus brachystachys** Bl. Fl. Jav. fasc. 8, p. 13 and 14, t. 2.—*Sarcandra chloranthoides* Gardn. Wight Ic. t. 1946.

A small bush about 1.2 m., stems cylindrical, glabrous, dark green. Leaves rather large, 12.5-18 cm., lanceolate, tapering at both ends, very acute, coarsely spinous-serrate, glabrous and shining; petioles 6-13 mm., connate and forming a short stipular sheath. Flowers sessile, in connate pairs of a male and female (looking like a single flower) in short lax spikes forming a terminal paniculate inflorescence, bracts small; stamens large and conspicuous, fusiform, pointed; ovary glabrous. Fruit 8 mm., broadly ovoid, apiculate, purplish black.

Distribution: Khasia Hills, Malay Peninsula, Travancore, Ceylon.—China, Japan, Philippines.

It is a good stimulant.

Igorrote: Emem—.

MYRISTICACEÆ.

Evergreen trees often stellately tomentose. Leaves alternate, entire, often pellucid-punctate; stipules 0. Flowers small, diœcious, regular, fasciculate, umbellate or paniculate; bracteoles persistent or caducous. Perianth simple, inferior, coriaceous, deciduous; lobes usually 3, sometimes 2 or 4, connate below, valvate in bud. Male flowers: Stamens monodelphous, 3-18 (less often 30-45); anthers usually sessile, ovate or linear, 2-celled, adnate dorsally to a central vertical cylindric or angled sessile or stalked column, free from each other or connate, less often attached by their bases, without or with short filaments, to the edge of a peltate stipitate disk; dehiscence always extrorse; rudimentary pistil 0. Female flowers : Staminodes 0 or very rare. Ovary free, sessile at the base of the perianth, 1-celled; ovule solitary, basal, erect, anatropous; stigma usually sessile (rarely

with a short style), capitate, discoid or lobed. Fruit more or less fleshy or thickly coriaceous, often splitting into 2 (rarely 4) valves. Seed erect, enclosed in a fleshy or membranous entire lobed or laciniate, usually highly coloured, often aromatic aril; testa usually thick; albumen copious, hard, ruminate; embryo small, basal; cotyledons divaricate, flat or crumpled; radicle short, inferior.—Genus 1. Species 85.—Palæotropics.

Aromatic stimulant properties characterize the Order therapeutically.

Official :—*Myristica fragrans* Houtt. (Austria, Belgium, France, Germany, Great Britain, Holland, Hungary, Japan, Russia, Spain, Sweden, Switzerland, Turkey, United States)=*M. moschata* Thunb. (Italy); *M. moschata* Thunb.=*M. fragrans* Houttuyn (Portugal.)

Myristica Linn.

Characters of the order.

1. Anthers 10-15 .... 1. *M. malabarica.*
2. Anthers 9-12 .... 2. *M. fragrans.*

Aromatic, stimulant, stomachic, antispasmodic, carminative; narcotic in large quantities.

The following are used medicinally in China and Malaya—*M. fragrans* Houtt.—; in the Malay Archipelago—*M. fatua* Houtt., *M. fragrans* Houtt.—; in New Guinea—*M. argentea* Warb.—; in Colombia—*M. Otoba* H. B. K.—; in Guiana—*M. sebifera* Sw., *M. fragrans* Houtt.—; in Brazil—*M. officinalis* Mart., *M. sebifera* Sw.—; in the West Indies—*M. fatua* Houtt.—; in Madagascar—*M. acuminata* Lam., *M. madagascariensis* Lam., *M. vouri* Baillon—.

Official :—The seeds of *M. fragrans* Houtt. (Austria, Belgium, France, Great Britain, Holland, Hungary, Japan, Spain, Sweden, Switzerland, Turkey, United States),=*M. moschata* Thunb. (Italy); *M. moschata* Thunb.=*M. fragrans* Houttuyn (Portugal).

The oil from the seeds of *M. fragrans* Houtt. in Austria, France, Germany, Russia.

1. **Myristica malabarica** Lamk. in Mém. Acad. Sc. Par. (1788) 162.—PLATE 825.

A moderate sized tree, all parts but the inflorescence glabrous; bark smooth with small lenticular spots, the inner bark with much red juice; young branches very thin, pale. Leaves thinly coriaceous, 10-15 by 3.2-5.6 cm., oblong or elliptic-lanceolate, subacute, shining above, dull beneath, base acute; main nerves 8-14 pairs, slender, not very prominent; petioles 1-1.3 cm. long. Male flowers in slender open 2-3-chotomous axillary or lateral subumbellate cymes 2.5-5 cm. long; buds 5 mm. long, ovoid-globose; peduncles long, slender; pedicels 6-13 mm. long, slender, puberulous; bracteole small, suborbicular, closely appressed to the base of the flower at one side. Perianth minutely scurfy-puberulous outside, glabrous inside; teeth short, triangular. Staminal column stalked, apiculate; stalk about ¼ the height of the column, tomentose; anthers 10-14, linear. Female flowers more globose and larger than the males, in few-flowered axillary umbels scarcely longer than the petioles. Perianth-teeth ovate. Bracteole forming a narrow imperfect cup round the base of the perianth. Ovary sessile, ovoid-globose, pointed densely rufous-tomentose; stigma large, sessile, 2-lobed. Fruit elongate, oblong, pointed, densely rufous-tomentose, 5-6.3 by 2.5-3.2 cm. Seed oblong, obtuse, slightly flattened on one side; testa shining; aril yellow, irregularly lobed and laciniate, extending to the apex of the seed.

Distribution: Evergreen forests of Konkan Ghats and Kanara.

The seeds in the form of a lep are used as an external application in Bombay.

The fat mixed with a little oil is applied to indolent and ill-conditioned ulcers; it allays pain, cleanses the surface and establishes healthy action.

Bombay: Janglikaiphal, Kaiphal, Rampatri, Ranjaiphal—; *Canarese:* Kanage—; *English:* False Nutmeg—; *Kadir:* Cholaivengai, Cholavenna—; *Malayalam:* Kattujattika, Kottappannu, Ponnampanu—; *Sanskrit:* Kamuka, Malati—; *Tamil:* Kattuchadi, Kattujadikkai, Pattiri, Periyagattuchadi—; *Telugu:* Adavijajikaya—.

2. **Myristica fragrans** Houtt. Hist. Nat. II. 3. 233.

A lofty tree, branches slender. Leaves coriaceous, 7.5-8.8 cm., elliptic -oblong or -lanceolate, acuminate, sometimes oblanceolate, and tip caudate, base acute, pale yellow-brown, paler with red-brown nerves beneath, nerves about 8 pairs, slender; petiole 6-13 mm. Male racemes 2.5-5 cm.; flowers bracteolate, 6 mm. long, ellipsoid or urceolate, nodding; males in lax slender supra-axillary racemes; bracteole a scale under the glabrate perianth; anthers 9-12, connate in a cylindric stipitate column. Fruit ovoid, subglobose or pyriform, 3.8-5 cm. long.

Distribution: A native of the E. Moluccas.—Cultivated in the Malay Peninsula and the Malay Islands.

The fruit is bitter, hot, pungent; astringent to the bowels, anthelmintic, aphrodisiac; improves appetite, taste, voice; useful in "kapha", "vata", foul breath, bronchitis, vomiting, thirst, diseases of the heart, urinary discharges.—The oil is stimulant, carminative; useful in diarrhœa, convulsions, pains, ulcers; improves the appetite. —The mace has a bitter pungent taste; anthelmintic, alexiteric; useful in bronchitis, asthma, thirst; improves the appetite (Ayurveda).

The nut and the mace are diuretic, lactagogue, stimulant, hypnotic, digestive, tonic, aphrodisiac; useful in choleraic diarrhœas, diseases of the liver and spleen, headache, palsy, eye troubles (Yunani).

The seeds are carminative and stomachic; useful in flatulency, nausea, and vomiting. When given at all largely it is essentially narcotic.

Actually in Europe it is mostly employed as a flavouring for medical or culinary purposes.

The Chinese do not use nutmeg much as a spice, but as a carminative, stomachic, and antispasmodic among medicinal remedies for children and the aged.

The nut is a Cambodian remedy for looseness of bowels.

The nutmeg is useless in the symptomatic treatment of snake-bite (Mhaskar and Caius).

Arabic: Jiansiban, Jouzbawwa—; *Cambodia:* Boch Kak—; *Canarese:* Jaji, Jajikayi, Jajipatri, Jati—; *Ceylon:* Sadhikai—; *Chinese:* Jou Tou K'ou, Tou K'ou—; *Danish:* Muskadnoed, Muskadnoedtree—; *Dutch:* Muskaatnoot, Nootemoskaatboom, Nootenmoskaat—; *English:* Common Nutmeg, False Aril, Fragrant Nut-tree, Mace Tree, Nutmeg, True Nutmeg—; *French:* Muscade, Muscadier—; *French Guiana:* Muscade—; *German:* Muskatnuss, Muskatnussbaum—; *Greek:* Karyon aromatikon, Karyon myristicon, Mochokaryon, Moscharion—; *Hova:* Raravazaha—; *Hindi:* Jaiphal—; *Hungarian:* Szerecsendio—; *Italian:* Moscatero, Noce moscata—; *Malaya:* Tow Khow—; *Malayalam:* Jati, Jatikka, Jatikosam, Jatipatri, Jatiphalam, Surabhi—; *Persian:* Gauzibuya—; *Portuguese:* Moscadeiro, Noz moschada—; *Roumanian:* Nucsoara—; *Russian:* Muskatnoe trava—; *Sanskrit:* Ghatastha, Jaiphala, Jati, Jatikosha, Jatiphala, Jatishasga, Kosha, Koshaka, Madashaunda, Majjasara, Malatiphala, Phala, Puta, Rajabhogya, Shaluka, Sumanaphala—; *Sinhalese:* Sadhika—; *Spanish:* Arbol de la nuez moscada, Moscadero, Nuez de Banda, Nuez de especia, Nuez moscada—; *Swedish:* Muskot, Muskot-trae—; *Tamil:* Adipalam, Attigam, Kosam, Sadi, Sadikkay, Salugam, Samuttirandam, Sidam, Sinevam, Sirugaridam, Sivagaram, Sivigara, Sivigaram—; *Telugu:* Jaji, Jajikaya, Jajipattiri, Jati, Jatipatri, Jatiphalamu, Lavangamu—; *Tulu:* Jajikayi, Jakayi—; *Turkish:* Cevzi—; *Uriya:* Jaipholo, Jaitri, Joyotri—.

LAURACEAE.

Erect aromatic trees or shrubs usually evergreen [very rarely (CASSYTHA) leafless parasitic climbers]. Leaves alternate (rarely opposite or deciduous), gland-dotted; stipules 0. Flowers regular, small, hermaphrodite (rarely 1-sexual), in axillary cymes, clusters, racemes or panicles; bracts deciduous, often involucrate, sometimes 0. Perianth usually inferior; tube short, sometimes enlarging in fruit; lobes of limb usually 6 (rarely 4), 2-seriate, the lobes of each series imbricate (rarely subvalvate), all similar, small, herbaceous or petaloid and equal; or the outer rarely smaller very rarely longer than the inner, occasionally one or more lobes abortive or one or more additional lobes present. Stamens usually a multiple of the perianth-lobes in 2-4 series on the tube; filaments flattened, the inner or some or all the filaments often 2-glandular at the base; anthers erect, 2- or 4- celled, the cells dehiscing by upcurved at length deciduous valvular lids. Ovary sessile at the base of the perianth-tube, 1-celled; ovule solitary, anatropous, pendulous from the apex of the cell. Fruit a dry or fleshy berry, naked or rarely enclosed in or adnate to the perianth-tube, the stalk often thickened. Seed pendulous; testa membranous; albumen 0; cotyledons plano-convex, fleshy; radicle minute, superior.—Genera 40. Species 1000.—Tropics and subtropics; chief centres S.-E. Asia and Brazil.

A. Shrubs or trees. Third row of stamens if present with the anther-cells opening outwards by valves
  1. Fruiting perianth with deciduous lobes and persistent base wholly or in part. Anthers 4-celled .... CINNAMOMUM.
  2. Fruiting perianth with persistent reflexed lobes. Anthers 4-celled .... MACHILUS.

B. All the anthers opening inwards
  1. Flowers diœcious, enclosed in densely imbricating bracts. Anthers 4-celled .... ACTINODAPHNE.
  2. Flowers diœcious, umbelled; umbels involucrate. Anthers 4-celled .... LITSEA.
  3. Flowers umbelled; umbels involucrate. Anthers 2-celled .... LINDERA.

C. Twining leafless herbs or shrubs .... CASSYTHA.

Therapeutically the order exhibits aromatic, tonic, stimulant, and sedative properties.

Among the substances obtained may be mentioned camphor, cinnamic aldehyde, cinnamic and tannic acids, and alkaloids—bebeerine, buxine, laurotetanine—.

OFFICIAL :—Camphor (Austria, Belgium, Denmark, France, Germany, Great Britain, Holland, Hungary, Italy, Japan, Norway, Portugal, Spain, Switzerland, Turkey, United States);—bromide (Belgium, France, Holland, Italy, Japan, Portugal, Spain, Switzerland).

Camphora officinarum Nees (France).

Cinnamomum camphora Nees and Ebermaier (Austria, Denmark, Great Britain, Holland, Norway, Sweden, Switzerland, United States) =*Laurus Camphora* Linn. (Italy, Spain), —F. Nees and Ebermaier (Hungary),—(Linne) Nees and Ebermaier (Germany, Turkey, United States); *C. Cassia* Blume (Hungary, Italy, Japan, Norway), —(Nees) Blume (Switzerland)=*C. aromaticum* Nees (Russia); *C. ceylanicum* Breyne (Austria, Denmark, Norway),—Nees (Germany, Turkey); *C. Loureirii* Nees (Japan, United States); *C. zeylanicum* Nees (Great Britain, Holland),—Breyn (Belgium), —Breyne (France, Italy, Spain, Sweden, Switzerland).

Laurus camphora Linn. (Belgium)=*Camphora officinarum* G. Bauh. and C. G. Nees (Portugal); *L. Cinnamomum* Linn.= *Cinnamomum zeylanicum* Breyn. var. *communis* Nees (Portugal); *L. nobilis* Linn. (Austria, Belgium, France, Germany, Holland, Italy, Norway, Russia, Switzerland)=*L. vulgaris* G. Bauh. (Portugal); *L. Sassafras* Linn.=*Sassafras officinale* Nees (Portugal).

Nectandra Puchury major Nees (Ocotea Puchury major Mart.), *N. Rodieii* Schomburgk (Portugal).

Sassafras officinale Nees (Austria, Germany, Japan)=*Laurus Sassafras* Linn. (Spain); *S. officinalis* Nees (Switzerland).

CINNAMOMUM Bl.

Evergreen trees or shrubs. Leaves opposite or alternate, usually 3-nerved. Flowers small, hermaphrodite or by abortion polygamous, in axillary and subterminal panicles, the females usually largest and sometimes with fewer parts. Perianth-tube short; lobes of limb

subequal. Stamens 9 perfect, or by abortion fewer, those of the 2 outer rows with eglandular filaments and introrse 4-celled anthers, those of the third row with glandular filaments, the glands subsessile or stipitate, and extrorse 4- (rarely 2-) celled anthers, those of the fourth row replaced by shortly stipitate cordate or sagittate staminodes. Ovary sessile, free from the perianth, narrowed into the style; stigma discoid or obscurely 3-lobed. Fruit a berry, resting on the spreading more or less enlarged perianth, the segments of which are wholly or partly deciduous, less often persistent. Seed with thin testa.—Species 80.—Indo-Malayan.

A. Leaves opposite or subopposite, triple-nerved
   1. Leaves 7.5-25 cm. long, ovate-oblong or lanceolate, usually acuminate, 3-nerved .... 1. *C. tamala.*
   2. Leaves quite glabrous, 20-30 cm. long, very coriaceous, elliptic-oblong, obtuse, acute or acuminate, 3-nerved .... 2. *C. obtusifolium.*
   3. Leaves quite glabrous, 5-10 cm., ovate or ovate-lanceolate, acuminate, 3-nerved .... 10. *C. pauciflorum.*
   4. Leaves 15-30 cm., elliptic or elliptic-oblong, acuminate, strongly 3-nerved .... 11. *C. javanicum.*
   5. Leaves 7.5-10 cm., glabrous, oblong to oblong-lanceolate, caudate-acuminate, 3-nerved .... 9. *C. cassia.*
   6. Leaves glabrous, 7.5-20 cm. long, lanceolate-oblong or linear-oblong .... 3. *C. iners.*
   7. Leaves 10-18 cm., glabrous, very coriaceous, ovate or ovate-lanceolate, 3-5-nerved .... 4. *C. zeylanicum.*
   8. Leaves 12.5-20 cm., oblong-lanceolate, 3-5-nerved .... 5. *C. macrocarpum.*

B. Leaves alternate, penninerved
   1. Leaves long-acuminate, blade 5-10 cm.; petiole 2.5-3.8 cm., secondary nerves 2-3-pairs .... 8. *C. camphora.*
   2. Leaves 7.5-12.5 cm., elliptic or lanceolate, caudate-acuminate .... 6. *C. glanduliferum.*
   3. Leaves extremely variable, the largest 20 by 10 cm. coriaceous, others thinner, almost membranous, and glaucous beneath .... 7. *C. parthenoxylon.*

Stimulant and stomachic.

The following species are used medicinally in China—*C. camphora* Nees., *C. cassia* Blum., *C. loureiri* Nees., *C. pedunculatum* Nees.—; in Malaya—*C. camphora* Nees., *C. cassia* Bl.—; in the Philippine Islands—*C. pauciflorum* Nees., *C. tamala* Nees.—; in the Malay Archipelago—*C. camphoratum* Blum., *C. caryophylloides* Blum., *C. culilawan* Blume., *C. javanicum* Blum., *C. sintok*

Blum.—; in New Guinea—*C. xanthoneuron* Blum.—; in Fiji—*C. pedatinervium* Meissn.—; in Brazil—*C. cassia* Nees.—.

OFFICIAL :—The bark of *C. camphora* Nees and Ebermaier (Austria, Denmark, Great Britain, Holland, Norway, Sweden, Switzerland, United States)=*Laurus Camphora* Linn. (Italy, Spain), —F. Nees Ebermaier (Hungary),—(Linne) Nees and Ebermaier (Germany, Turkey, United States); *C. Cassia* Blume (Hungary, Italy, Japan, Norway),—(Nees) Blume (Switzerland)=*C. aromaticum* Nees (Russia); *C. ceylanicum* Breyne (Austria, Denmark, Norway), —Nees (Germany, Turkey); *C. Loureirii* Nees (Japan, United States); *C. zeylanicum* Nees (Great Britain, Holland),—Breyn (Belgium),—Breyne (France, Italy, Spain, Sweden, Switzerland).

1. **Cinnamomum tamala** Fr. Nees in Nees and Eberm. Med. Pharm. Bot. II, 426, and Plant Officin. fasc. 4.—*C. albiflorum* Nees; Wight Ic. t. 140.—PLATE 826.

A small evergreen tree up to 1.4 m. girth and 7.5 m. high. Bark dark brown or blackish, slightly rough. Blaze 1.3 cm., pinkish- or reddish-brown with whitish streaks towards the exterior. Leaves opposite, subopposite or alternate, 12.5-20 by 5-7.5 cm., ovate-lanceolate or -oblong, acuminate, the acumen often falcate, coriaceous, glabrous, scarcely shining above, glaucous beneath, 3-nerved from close above the base almost to the apex. Petiole 7.5-13 mm. long. Flowers 7.5 mm. long, pale yellowish, in axillary and terminal lax puberulous panicles 5-15 cm. long. Perianth-lobes 6, oblong, silky pubescent, breaking off transversely below the middle after flowering. Perfect stamens 9. Filaments villous. Drupe 13 mm. long, ovoid, fleshy, black, supported by the somewhat enlarged perianth-tube bearing the truncated perianth-lobes.

Distribution: Tropical and subtropical Himalaya, 3,000-7,800 ft., Sylhet and Khasia Hills, 3,000-4,000 ft.

The leaf is bitter, sweetish; heating, alexiteric; useful in "vata", scabies, diseases of the anus and rectum, "tridosha", piles, heart troubles, ozoena, bad taste (Ayurveda).

The leaf has a sharp taste; tonic to the brain, anthelmintic, diuretic; good for the liver and spleen; useful in inflammation, sore eyes; stops salivation (Yunani).

In the Punjab, the leaves are used in rheumatism, being considered stimulant; also in colic and diarrhœa. The bark is given for gonorrhœa. Given in decoction or powder in suppression of lochia after child-birth, with much benefit.

The oil from the bark is ineffective as an anthelmintic (Caius and Mhaskar).

The leaves are not an antidote to either snake-venom (Mhaskar and Caius) or to scorpion-venom (Caius and Mhaskar).

Arabic: Sazij, Zarnab—; *Assam:* Dopatti—; *Bengal:* Tejpat—; *Bombay:* Darchini, Tamala—; *Burma:* Thitchabo, Thitkyabo—; *Canarese:* Dalchini, Lavangadapatti, Lavangapatri, Lavangapatte, Patraka—; *Deccan:* Barmi, Tejpat—; *English:* Cassia lignea, Cassia Cinnamon—; *Gujerati:* Taj, Tamalpatra—; *Hindi:* Barahmi, Dalchini, Darchini, Kikoa, Kirkiria, Silkanti, Sinkami, Tajkalam, Tajkalmi, Tajpat, Talispatri, Talisputar, Tezpat—; *Ilocano:* Kandaroma—; *Jaunsar:* Gurandra—; *Kumaon:* Dalchini—; *Lepcha:* Nupsor, Songsor—; *Marathi:* Dalchinitiki, Sambharapana, Tamalapatra—; *Nepal:* Chotasinkoli, Sinkoli, Tezpat—; *Persian:* Sadrasu—; *Sanskrit:* Ankusha, Chhadana, Dala, Dalavhaya, Gandhajata, Gomeda, Gopana, Ishtagandha, Pakranjana, Palasha, Patra, Patraka, Patrakhya, Roma, Romasha, Shitarasa, Sukumaraka, Suranirgandha, Surasa, Tamalaka, Tamalapatra, Tapasa, Tejapatra, Vasa, Vasanavhaya, Vastra—; *Tagalog:* Kalingag, Makalingag—; *Tamil:* Talishappattiri—; *Telugu:* Tallishapatri—; *Urdu:* Tejapat—; *Visayan:* Kalingag, Makalingag—.

2. **Cinnamomum obtusifolium** Nees in Wall. Pl. As. Rar. II, 73; Wight Ic. t. 139.—PLATE 827.

An evergreen tree, all parts glabrous; bark about 8 mm. thick, grey, fibrous, but even, narrowly fissured; cut greenish white. Leaves oblong to oblong-lanceolate, 15-25 cm. long, obtuse or almost rounded at the base, on a strong glabrous petiole 13 mm. long, more or less bluntish acuminate, rigidly coriaceous, glabrous, glaucous beneath, strongly 3-nerved, the net-venation little visible. Flowers white, small, on silky-hairy pedicels longer than the perianth, forming slender glabrous or slightly silky-hairy cymose panicles in the axils

of the leaves or crowded at the end of the branchlets; perianth-segments about 3 mm. long; obovate-oblong; drupes succulent, oblong, small and only about 8 mm. long; perianth-receptacle not much enlarged and covering only the base of the drupe.

Distribution: Central and E. Himalaya, up to 7,000 ft., Assam, Tenasserim, Andaman Islands.

In Nepal, the bark is used in dyspepsia and liver complaints (Gimlette).

Assam: Patichanda—; *Bengal:* Kinton, Ramtezpat, Tezpat—; *Burma:* Lulengkyaw—; *Kumaon:* Phatgoli—; *Magahi:* Krowai—; *Mechi:* Dupatti—; *Lepcha:* Nupsor—; *Nepal:* Barasingoli, Bhalesin-koli—.

3. **Cinnamomum iners** Reinw. in Blume Bijdr. 570; Wight Ic. t. 122.—Plates 828 and 829.

Tree, about 12 m. tall, with a short thick stem and large bushy top; branchlets glabrous. Leaves coriaceous, when young white, then red, finally deep green, elliptic or elliptic-oblong, variable, 12.5-18 cm. long, 3.8-7.5 cm. wide; nerves 3, nervules and reticulations almost or quite invisible; glabrous beneath; petioles 5 mm. long. Panicles about 15 cm. long, lax. Flowers and pedicels silky, yellow within, 2.5 mm. long, foetid, tube very short; sepals ovate, subacute. Fruit ellipsoid, black, pulpy, blunt, 1-1.5 cm. long, cupule very short.

Distribution: Tenasserim, Malay Peninsula.—Sumatra, Java.

The seeds, bruised and mixed with honey or sugar, are given to children in dysentery and coughs, and combined with other ingredients in fevers.

The oil from the inner bark is ineffective as an anthelmintic (Caius and Mhaskar).

Bombay: Tikhi—; *Burma:* Lenkyan, Lulengkyaw, Nalingyaw, Sikiyabo, Thitkyambo, Tikyobo—; *Canarese:* Adavilavangapatte, Dalchini, Dalchiniyanne, Kuddulavanga, Lavangadayale, Lavangayale, Yellagada—; *Deccan:* Janglidalchini—; *Hindi:* Darchini, Janglidar-chini—; *Malay:* Kayu manis hutan, Lelang—; *Malayalam:* Katkarva,

Kotkarva, Kattukaruvatoli—; *Marathi:* Ranachadalchini, Randalchini—; *Tamil:* Kattukkaruvappattai, Sembelappulippilla—; *Telugu:* Adavilavangapatta, Pachaku—.

4. **Cinnamomum zeylanicum** Breyn. in Ephem. Nat. Cur. dec. I. ann. 4, 139; Wight Ic. t. 123, 129, 134.—PLATE 830A.

A moderate sized evergreen tree; bark rather thick, smooth, pale; twigs often compressed; young parts glabrous except the buds which are finely silky. Leaves opposite or subopposite (rarely alternate), hard and coriaceous, 7.5-20 by 3.8-7.5 cm., ovate or ovate-lanceolate, subacute or shortly acuminate, glabrous and shining above, slightly paler beneath, base actue or rounded; main nerves 3-5 from the base or nearly so, strong, with fine reticulate venation between; petioles 1.3-2.5 cm. long, flattened above. Flowers numerous, in silky-pubescent lax panicles usually longer than the leaves; peduncles long, often clustered, glabrous or pubescent; pedicels long. Perianth 5-6 mm. long; tube 2.5 mm. long; segments pubescent on both sides, oblong or somewhat obovate, usually obtuse. Fruit 1.3-1.7 cm. long, oblong or ovoid-oblong, minutely apiculate, dry or slightly fleshy, dark purple, surrounded by the enlarged campanulate perianth which is 8 mm. diam.

Distribution: Burma, W. Peninsula, Ceylon, Malay Peninsula, indigenous or cultivated.—Cultivated in the Malay Islands and elsewhere in the tropics.

The bark is bitter, pungent, with a flavour; aphrodisiac, anthelmintic, tonic; useful in "vata", biliousness, thirst, parched mouth, bronchitis, diarrhœa, itching, diseases of the heart and rectum, urinary diseases.—The oil is styptic, carminative; useful in loss of appetite, flatulence, eructations, vomiting, toothache (Ayurveda).

The bark has a sharp hot taste; tonic, alexiteric, carminative, aphrodisiac, expectorant; causes salivation; useful in hydrocele, flatulence, heated brain, headache, hiccough, piles, scorpion-sting; strengthens the liver.—The oil is carminative, emmenagogue, tonic to the liver; useful in inflammations, abdominal pains, cold in the head, bronchitis (Yunani).

The bark is aromatic, astringent, stimulant, and carminative. It

is a fragrant cordial especially useful for weakness of the stomach and diarrhœa. It checks nausea and vomiting.

The essential oil from the bark, and pure cinnamic aldehyde are quite ineffective as anthelmintics (Caius and Mhaskar).

The bark is not an antidote to either snake-venom (Mhaskar and Caius) or to scorpion-venom (Caius and Mhaskar).

The constituents of the essential oil from the leaves were isolated by Shintre and Sanjiva Rao (17th Ind. Sc. Congress; Allahabad, 1930—*Journ. Ind. Inst. Science;* XV, 1933).

Arabic: Darsini, Qirfahesailaniyah—; *Bengal:* Dalchini, Qalamidarchini—; *Bombay:* Bojevar, Dalchini, Ohez, Taj, Tikhi—; *Burma:* Hmanthin, Lulingyaw, Simbosikiyabo, Thitkyabo, Timbolikyobo—; *Canarese:* Dalachini, Dalchini, Kaduvudalchini, Lavangachakke, Lavangapatte, Nisane, Nisani, Nisne, Tejadalchini—; *Ceylon:* Kuruva—; *Deccan:* Dalchini, Qalamidarchini—; *Dutch:* Kaneel—; *English:* True Cinnamon—; *French:* Bois de cannelle, Cannelier, Laurier cannelier—; *German:* Ceylonzimt—; *Gujerati:* Dalchini, Taj—; *Hindi:* Dalchini, Darchini, Qalamidarchini—; *Italian:* Cannella, Cannella di Ceylon, Cannella regina—; *Kadir:* Lavanga—; *Konkani:* Tiqui—; *Malayalam:* Cheriyilaivannam, Erikkolam, Etuna, Ilavangam, Ilavannam, Karun, Varanam—; *Marathi:* Dalchini, Darachini—; *Persian:* Darchinisailaniyah, Talikhahe—; *Portuguese:* Canela da India—; *Punjab:* Darchini, Kirfa—; *Roumanian:* Scortisoare—; *Russian:* Karitsa—; *Sanskrit:* Bahugandha, Balya, Bhringa, Bijjula, Chocha, Chola, Darusita, Gudatvacha, Hridya, Kamavallabha, Lataparna, Mukashodhana, Nalada, Patra, Ramavallabha, Rameshta, Satakata, Shakala, Shita, Sinhala, Surabhivalkala, Surasa, Tamalapatra, Tanutvaka, Tapinchchha, Tvacha, Tvaka, Tvakapatra, Utkata, Valkala, Vanapriya, Vara, Varanga, Varangaka—; *Seychelles:* Cannelier—; *Sinhalese:* Kurundu, Rassukurundu—; *Spanish:* Arbol de la canela, Canalero, Canela de Ceylan, Canela de Holanda, Canelo—; *Swedish:* Ceylonkanel—; *Tamil:* Cannalavangapattai, Ilavangam, Ilavangapattai, Karuva, Pulambilavu, Sorachattorachi—; *Telugu:* Lavangamu, Lavangapatta, Sannalavanga—; *Tulu:* Ijin—; *Turkish:* Tarcin—; *Urdu:* Darchini—; *Uriya:* Dalochini, Daruchini, Gudotwoko, Tapinchchha—.

5. **Cinnamomum macrocarpum** Hook. f. in Hook. f. Fl. Brit. Ind. V, 133.

A moderate sized evergreen tree; branches slender. Leaves 11.5-18 by 4.5-6.3 cm., thinly coriaceous, elliptic-lanceolate or oblong-lanceolate, 3-5-nerved, the lateral nerves sometimes starting 1.7 cm. above the base; petioles 1.3-2.5 cm. long. Flowers in panicles shorter than the leaves. Fruiting perianth apparently fleshy, broadly infundibuliform, 1.7 cm. diam., shortly 6-toothed. Fruit 2.5 by 2 cm., globosely oblong.

Distribution: N. Kanara.

The oil from the root bark and the leaves is used in rheumatic affections as an external medicine.

Canarese: Bhrynga, Dalachini, Dalchini, Lavangapatre—; *Malayalam:* Chochakam, Ilavannam, Karuva, Tamala, Tvakpatram—; *Sanskrit:* Tamalapatra, Tejapatra, Tvacha, Tvakpatra—; *Tamil:* Ilavangappattai, Karuva, Periyalavangappattai, Sirunagappu, Talichappattiri—; *Telugu:* Lavanga, Magacherulu, Moddulavangapatta, Talisapatramu—; *Uriya:* Twokpotro—.

6. **Cinnamomum glanduliferum** Meissn. in DC. Prodr. XV, 1, 25 (excl. var. β).—PLATE 830B.

A small tree up to 1.5 m. girth. Leaves 7.5-12.5 cm. long, alternate, elliptic or lanceolate, caudate-acuminate, puberulous beneath when young, glabrous when mature, thickly coriaceous, often glaucous beneath; lateral nerves 3-4 pairs. Petiole 1.3-2.5 cm. long, slender. Flowers 2.5 mm. diam., yellowish green, in lax long-peduncled few-flowered glabrous axillary panicles 3.8-6.3 cm. long. Perianth-lobes sparsely pubescent without, villous within. Stamens hairy. Ovary glabrous.

Distribution: Central Himalaya, Khasia Hills.

The wood is a good substitute for sassafras.

Assam: Gunserai—; *Cachar:* Gundroi—; *Lepcha:* Rohu, Rohun—; *Mechi:* Gunserai—; *Nepal:* Kawla, Malligiri, Marisgiri—.

7. **Cinnamomum parthenoxylon** Meissn. in DC. Prodr. XV, 1, 26.—*Sassafras parthenoxylon* Nees; Wight Ic. t. 1832.—PLATE 831.

Lofty tree, 9-30 m. tall with whitish rough bark. Leaves red when young, adult subcoriaceous dark green, glaucous beneath, elliptic-ovate, acute or acuminate, base acute or round; nerves pinnate, slender, 3 pairs from the midrib; 5-10 cm. long, 2.5-4.5 cm. wide; petioles slender, 2.5-3.2 cm long. Panicles numerous, slender, glabrous; peduncle 2.5-5 cm. long; branches 1.3 cm. long, cymose at the top. Flowers few on each, 2.5 mm. across, light yellow. Perianth-tube funnel-shaped, glabrous, lobes oblong, villous inside. Drupe globose, 7 mm. across; perianth-tube enlarged, 4.5 mm. across, tube funnel-shaped, 5 mm. long.

Distribution: Malay Peninsula.—Sumatra, Java, China.

The fruit yields an oil used in rheumatic affections. An infusion of the root is also employed as a substitute for Sassafras.

Burma: Kaaway—; *Malay:* Kayogadis—.

8. **Cinnamomum camphora** F. Nees Handb. Med.-Pharm. Bot. II, 430.—*Camphora officinarum* Bauh; Wight Ic. t. 1818.

Quite glabrous. Leaves alternate, chartaceous or finally coriaceous, long-petiolate, ovate or oblong, or lanceolate-oblong, at both ends attenuate-acute, 3-nerved, delicately transversely veined on the upper side, shining, 5-12.5 cm. long, 2.5-5 cm. broad, uniformly coloured on both sides or below paler or glaucous. Panicles axillary, shorter than the leaf, peduncle thin branching at the apex, branches 3-1-flowered, calyx yellow, slightly longer than the pedicel, about 3 mm. long, lobes inside slightly cano-tomentose.

Distribution: Commonly cultivated in India.—Japan and China.

Every part is credited with sedative, anodyne, antispasmodic, diaphoretic, and anthelmintic properties. Internally the plant is used in colds, chills, and in diarrhœas from cold; externally it is applied to cases of inflammations, bruises, and sprains.

The essential oil from the tree and pure camphor are quite ineffective as anthelmintics (Caius and Mhaskar).

Sanjiva Rao, Sudborough, and Watson have determined the camphor-content of (i) different portions of the camphor tree, (ii) different parts of the camphor tree grown in India and other countries, (iii) different portions of some camphor trees at different ages. They have also determined the analytical contents of several oils distilled at Bangalore (*Journ. Ind. Inst. Sc.;* VIII, 1925).

Canarese: Chandra, Davala, Dhavala, Karpura, Kumuda, Pachakarpura, Tuhina—; *Chinese:* Chang Nao—; *Danish:* Kamfertrae—; *Dutch:* Kamferboom—; *English:* Camphor, Camphor Cinnamon, Camphor Laurel, Camphor Tree of China, Camphor Tree of Japan, Common Camphor, Dutch Camphor, Tormosa Camphor, Gum Camphor, Officinal Camphor, True Camphor—; *French:* Bois de camphre, Camphrier, Camphrier du Japon—; *German:* Kampferbaum—; *Greek:* Kaphoura—; *Italian:* Canfora—; *Malayalam:* Ghanarasam, Himamsu, Himavaluka, Karppuravriksham, Sitamsu, Subhramsu—; *Portuguese:* Alcanforeira—; *Russian:* Kamfarnoi trava—; *Sanskrit:* Karpura—; *Sinhalese:* Kapurugaha—; *Spanish:* Arbol del alcanfor de la China, Arbol del alcanfor del Japon, Laurel del alcanfor—; *Tamil:* Indu, Kadalichi, Kanasaram, Karppuram, Karuppuram, Kirasemiram, Kuruvukkodi, Palidam, Palugam, Parmaganjari, Pattagesari, Pugalvisuvandiram, Sandiram, Sasi, Sidalam, Soman, Sudan—; *Telugu:* Chandramu, Chandrasanguyamu, Gambura, Gamburamu, Ghanasaramu, Himavaluka, Himavyayamu, Kappuramu, Karpuramu, Sitabhramu, Sitakaramu—; *Tulu:* Karpura—; *Uriya:* Bidhu, Chondrongyon, Ghonosaro, Glau, Jaibatryko, Kopuro, Korpuro, Poripotro, Ramokorpuro—.

9. **Cinnamomum cassia** Blume Bijdr. 570; Bentley & Trimen Med. Pl. III, t. 233.

An evergreen tree, all parts glabrous. Leaves oblong-lanceolate to lanceolate, on a slender 6-8 mm. long, petiole, more or less tapering at the triplinerved base, 7.5-10 cm. long, caudate-acuminate, coriaceous, the net-venation inconspicuous. Flowers small, on slender pedicels of about the length of the perianth or somewhat longer, forming short-peduncled, slightly silky, cymose panciles in the axils of the leaves and collected into larger ones at the end of the branchlets; perianth slightly silky, about 3 mm. long, the segments

oblong-lanceolate; Drupes sappy, the size of a pea, ellipsoid, glabrous; perianth-receptacle not much enlarged, truncate-6-lobed or the lobes often entirely persistent and not breaking off at their middle.

Distribution: Ava.—China.

The bark has a sweetish sharp taste; carminative, tonic, emmenagogue; useful in inflammations, pregnancy, headache, piles; enriches the blood (Yunani).

The bark is tonic, stomachic, and carminative. In medicine it is used as a substitute for Ceylon Cinnamon.

Arabic: Salikha—; *Chinese:* Chun Kuei, Koui Chou—; *English:* Cassia Bark, Cassia lignea, Chinese Cassia, Chinese Cinnamon—; *French:* Cannelle de Chine—; *German:* Chinesischer Zimt—; *Hungarian:* Fahej—; *Italian:* Cannella di China—; *Persian:* Taj—; *Russian:* Kitaiskaya Koritsa, Koritsa—; *Spanish:* Canelero de la China, Canelo de la China—; *Urdu:* Taj.—.

10. **Cinnamomum pauciflorum** Nees in Wall. Pl. As. Rar. II, 75.—*C. recurvatum* Wight Ic. t. 133.

A small tree, buds and young shoots glabrous. Leaves quite glabrous, 5-10 cm., ovate or ovate-lanceolate, acuminate, firmly coriaceous, usually glaucous and finely reticulated beneath, 3-nerved, rarely 5-nerved, tip sometimes caudate-acuminate, base acute rounded or cordate. Panicles shorter than the leaves, few-flowered, sometimes reduced to 3 flowers, nearly glabrous. Calyx-lobes wholly deciduous in fruit. Perianth 2.5-3 mm. long, Stamens hairy. Fruiting calyx very small, with a quite entire mouth.

Distribution: Khasia Hills 4,000 ft., Assam Valley and Sylhet.

In the Philippine Islands, the bark is much used as a stomachic, cardiotonic, and antiseptic.

Igorrote: Pata—; *Ilocano:* Candaroma—; *Philippines:* Canela—; *Tagalog:* Calingad,, Macalingag—; *Visayan:* Calinga, Calingad—.

11. **Cinnamomum javanicum** Bl. Bijdr. 570.

Shrub or tree; branchlets subquadrangular, woolly-tomentose. Leaves chartaceous, elliptic cuspidate, and long-narrowed to base,

shining bright green, glabrous above, tomentose-hairy beneath; nerves elevate both sides, but most beneath where thickly tomentose; transverse nervules conspicuous, very numerous, elevate beneath and sunk above in young plants, adult leaves quite glabrous, 18 cm. long, 7.5-10 cm. wide; petioles thick, 6 mm. long, tomentose. Panicles subterminal lax, stout, branches angled tomentose, 10-15 cm. long, lowest branches 7.5-10 cm. long. Pedicels stout. Flowers pubescent, up to 5 mm. long; tube funnel-shaped, lobes oblong. Fruit subglobose, fleshy, cupule thick, about 2.5 cm. long.

Distribution: Malay Peninsula.—Java, Borneo.

In the Malay Archipelago, the bark is used as a substitute for Ceylon Cinnamon.

MACHILUS Nees.

Evergreen trees. Leaves alternate, clustered near the ends of the branches, penninerved. Flowers small, hermaphrodite, in axillary panicles. Perianth-tube short or obsolete; segments 6, subequal, persistent, reflexed in fruit. Stamens 9 perfect, those of the 2 outer rows with eglandular filaments and introrse 4-celled anthers, those of the third row with filaments which have 2 stipitate glands at the base and extrorse 4-celled anthers, those of the fourth row replaced by stipitate cordate staminodes. Ovary sessile, narrowed into the style; stigma discoid. Fruit a globose or ovoid berry, seated on the persistent perianth. Seed with thin testa.—Species 20.—S. E. Asia to Japan.

The genus is therapeutically inert.

1. **Machilus macrantha** Nees in Wall. Pl. As. Rar. II (1831) 70; Wight Ic. t. 1824; Bedd. Fl. Sylv. t. 2664.

A large tree; young parts glabrous. Leaves coriaceous, 9-18 by 2.8-6.3 cm.; variable in shape, from oblong and rounded at both ends to elliptic-lanceolate and acute at both ends, glabrous, shining above, glaucous beneath, finely reticulately veined; main nerves 8-12 pairs, not conspicuous; petioles 2-3.2 cm. long. Flowers yellow, numerous, in panicles near the ends of the branches, often several

panicles together 15-20 cm. long, stout, puberulous. Perianth 6 mm. long, silky-pubescent inside and outside; tube very short; segments oblong or linear-oblong, subacute. Filaments hairy. Fruit 1.3-2 cm. diam., smooth, dark-green dotted with white, ultimately becoming black.

Distribution: W. Peninsula, Ceylon.

The bark is used in asthma, consumption, and rheumatism.

The leaves are applied to ulcers.

Badaga: Kruramavu—; *Canarese:* Chittutantre, Gulimavu—; *Coorg:* Kruramavu—; *Kadir:* Anakkuru, Iruli—; *Konkan:* Gumara—; *Malayalam:* Uravu—; *Saora:* Nara—; *Sinhalese:* Ululu—; *Tamil:* Anaikkuru, Kollamavu, Mulai—; *Tulu:* Nirkkukku—.

ACTINODAPHNE Nees.

Evergreen shrubs or trees. Leaves almost whorled, penninerved or 3-nerved. Flowers small, dioecious, in axillary or lateral dense sessile or pedunculate fascicles or umbels; bracts imbricating, caducous (not whorled). Perianth-tube short; segments 6, subequal. Male flowers : Stamens 9 perfect (rarely only 6), those of the 2 outer rows with eglandular filaments, the third row sometimes obsolete, if present with 2-glandular filaments; anthers of all three rows introrse, 4-celled. Ovary reduced and empty or obsolete. Female flowers : Staminodes 9. Ovary free; style longish; stigma dilated. Fruit a berry resting on the enlarged hardened flat spreading or concave perianth-tube. Seed with thin testa.—Species 50.—India, Japan, N. America.

The genus is therapeutically inert.

1. **Actinodaphne hookeri** Meissn. in DC. Prodr. XV, I (1864) 218 (excl. var. *longifolia*).—*A. angustifolia* Nees; Wight Ic. t. 1841.—PLATE 832.

A medium sized tree. Leaves coriaceous, in 2 whorls of 3 each, 10-18 by 4.5-6.3 cm., penninerved, elliptic-lanceolate, finely acuminate, the mature leaves glabrous above and usually clothed with

thin tomentum beneath, the young leaves densely silky with long tawny hairs, base usually acute; main nerves 6-10 pairs; petioles 1.3-2.5 cm. long, silky-pubescent. Flowers dioecious, yellowish, from the naked branches, the males in clusters of about 8, the females umbellate or subracemose on very short stout peduncles; pedicels clothed with tawny hairs, those of the female flowers longer than the male. Perianth densely clothed with tawny hairs; segments elliptic or ovate. Stamens 9 in the male flowers, reduced in the female to strap-shaped antherless staminodes, of the same number as the male stamens or less; filaments thickly covered with whitish hairs, the interior row of 3 with 2 somewhat reniform glands at the base of each filament, the glands in the male flowers slightly stalked, those of the female sessile. Style rather thick; stigma large, mushroom-shaped, oblique. Berry 8-13 mm. long, ellipsoid, red when ripe, seated on the cup-shaped enlarged perianth-tube.

Distribution: W. Peninsula.

A cold infusion of the leaves is mucilaginous, and is used in urinary disorders and in diabetes. The oil of the seeds is used as an external application to sprains.

Krishna and Ghose have isolated an alkaloid, actinodaphnine, from the bark (*Journ. Ind. Chem. Soc.*, 1932).

Bombay: Pisa—; *Canarese:* Haggodgimara, Tudgensu—; *Kadir:* Neyarum, Puvacha—; *Malayalam:* Malavirimji, Malavirinni, Neyarum—; *Marathi:* Pichli, Pisha, Pissa—; *Tamil:* Tali—; *Uriya:* Jadambo—.

Litsea Lam.

Evergreen (rarely deciduous) trees or shrubs. Leaves alternate (rarely opposite or subopposite), penninerved (rarely 3-nerved from the base); buds naked or scaly. Flowers small, dioecious, usually umbellate; umbels 4-6- (rarely more-) flowered, sessile or shortly pedunculate, axillary or in the scars of fallen leaves; bracts involucrate, 4-6 (rarely more) to an involucre, concave, coriaceous or membranous. Perianth-tube ovoid, campanulate, or very short; lobes of limb 6 or 4 (rarely fewer or more), equal or unequal or in

a few wanting. Male flowers: Stamens 9 or 12 in 3-merous, 6 in 2-merous flowers (sometimes by abortion fewer than 6 and in a few more than 12); filaments of the first and second rows usually eglandular, those of the third and fourth (if present) 2-glandular; anthers all introrse, 4-celled. Ovary minute, empty or obsolete (very rarely perfect). Female flowers: Staminodes 9 or 12, or in 2-merous flowers 6 (rarely more than 12). Ovary enclosed in the perianth-tube or free; style short or long; stigma usually irregularly lobed. Fruit a drupe or berry resting on the unchanged perianth or partly clasped at the base by the often much enlarged discoid or cupular perianth-tube. Seed with thin testa.—Species 180.—Tropical Asia, Australia.

1. Leaves alternate, 7.5-23 cm. long, coriaceous or chartaceous, elliptic-ovate or oblong; nerves 8-10 pairs .... 1. *L. chinensis.*
2. Leaves 7.5-40 cm., alternate, chartaceous, broadly or narrowly oblong, ovate or obovate; nerves 5-10 pairs .... 2. *L. polyantha.*
3. Leaves 10-15 cm., coriacous, oblong-lanceolate or oblanceolate, nerves 10-16 pairs .... 3. *L. stocksii.*

L. chinensis Lam. is used medicinally in La Reunion.

1. **Litsea chinensis** Lam. Encyc. Méthod. III (1789) 574.—*L. sebifera* Pers. Syn. II, 4.—Plate 833B (under *L. sebifera* Pers.).

A small evergreen tree up to 60 cm. girth and 7.5 m. high, often only a shrub. Bark pale brown, roughish, somewhat corky, lenticellate. Blaze 7.5-12.5 mm., cheesy, not fibrous, pale yellowish streaked and mottled with orange, the whole turning dirty brown on exposure, juice viscous. Twigs green, terete, grey-pubescent. Leaves 10-25 by 5-10 cm., elliptic ovate or oblong-lanceolate, acute or acuminate, base usually narrowed, pubescent especially on the nerves above, more or less grey-tomentose beneath, dull or slightly glossy dark green above, pale but not glaucous beneath; lateral nerves 8-13 pairs. Petioles 1.3-3.8 cm. long, grey-tomentose. Flowers yellowish, about 5 mm. diam., about 8-12 together in umbellate heads 13-16 mm. across arranged in lax pedunculate axillary corymbs 3.8-7.5 cm. long. Peduncles of heads 5-12.5 mm. long. Heads globose in bud, about 5 mm. diam., resembling flower-buds, surrounded by 4 orbicular tomentose bracts. Perianth-lobes generally wanting. Stamens up

to 20 or more. Filaments clothed with long soft hairs. Fruit 7.5 mm. diam., globose, black, supported by the thickened pedicel.

Distribution: Throughout the hotter parts of India, Ceylon.—Malay Islands, Australia.

The root is sweetish; cooling, aphrodisiac, galactagogue; useful in biliousnes, burning sensations, bronchitis, consumption, fever, "vata", leprosy (Ayurveda).

The root is sweetish bitter; astringent, tonic, expectorant, aphrodisiac; useful in inflammations, overheated brain, pains in the joints, thirst, throat troubles, diseases of the spleen, paralysis.—The seeds are aphrodisiac (Yunani).

The feebly balsamic, mucilaginous bark is one of the best known and most popular of native drugs. It is largely employed as a demulcent and mild astringent in diarrhœa and dysentery.

It is also esteemed as an aphrodisiac in Patna. Freshly ground, it is used either dry, or triturated in water or milk, as an emollient application to bruises, and as a styptic dressing for wounds. It is also supposed to be anodyne, and to act as a local antidote to the bites of venomous animals.

The oil from the berries is used in rheumatism; the leaves are mucilaginous.

In La Reunion, the leaves are used as an infusion or as a poultice. They are considered antispasmodic and emollient. The flower buds are credited with the same properties.

The bark is not an antidote to either snake-venom (Mhaskar and Caius) or scorpion-venom (Caius and Mhaskar).

Arabic: Kilz, Maghas, Maghasehindi—; *Bengal:* Garur, Kukurchita, Maidalakri, Ratun—; *Bombay:* Chickana, Maidalakadi, Maidalakri—; *Burma:* Ondon, Ongtong, Ungdung, Ungdungnet—; *Central Provinces:* Menda—; *Dehra Dun:* Chandna—; *English:* Common Tallow Laurel—; *Goa:* Mirio—; *Hindi:* Garbijaur, Maidalakri, Medh, Menda, Singrauf—; *Ilocano:* Sablut—; *Kumaon:* Banborla, Singhor, Singrau—; *La Reunion:* Avocat marron, Litsée—; *Lepcha:* Suppatnyok—; *Marathi:* Maidalakadi, Miri—; *North-Western Provinces:* Garbijaur, Singrauf—; *Oudh:* Medh—; *Persian:* Kilz—; *Punjab:* Chamana, Gwa, Maidasak, Medachob, Medalakri,

Medasak, Rian—; *Reddi:* Katuvukamma—; *Sanskrit:* Adhavara, Bahurandhrika, Bhavya, Dhira, Drava, Jivani, Jivanika, Madhura, Manichhidra, Meda, Medasara, Medini, Medodbhava, Medovati, Purushadantika, Rasa, Sadhavi, Shalyada, Shalyaparni, Shalyaparnika, Shreshtha, Snehavati, Snigdha, Svalpaparni, Vasa, Vibhavari—; *Sinhalese:* Bombe, Bombi, Bomi—; *Tagalog:* Pusopuso—; *Tamil:* Ama, Elambiragi, Elumpurukki, Pisinbattai—; *Telugu:* Kanujunalike, Meda, Nara, Naramamidi, Naranalike—; *Urdu:* Maidalakri—; *Uriya:* Jadamo—; *Visayan:* Lauat—.

2. **Litsea polyantha** Juss. in Ann. Mus. Par. VI, 211.—PLATE 834.

A small or medium sized evergreen tree usually not exceeding 1.2 m. girth and 12 m. high. Bark usually pale brown, roughish, somewhat corky, exfoliating in quite small polygonal scales. Blaze 2-3.8 cm., soft not fibrous, pale yellowish or yellowish brown lightly mottled with pale orange towards the exterior and darkening on exposure. Young shoots rusty pubescent. Leaves alternate, 7.5-23 by 3.8-12.5 cm., elliptic or elliptic-oblong, usually rounded at both ends, glabrous and dark rather glossy green above when mature, glaucous with distinct reticulate venation and pale yellowish brown pubescence beneath. Petiole 1-2.5 cm. long, brown-pubescent. Flowers about 5 mm. diam., pale greenish yellow, sessile or subsessile, about 5-6 together in rounded umbellate heads 1-1.3 cm. across. Peduncles of the heads 5-13 mm. long, solitary or clustered on dwarf side shoots. Pedicels up to 2.5 mm. long, elongated in fruit. Heads globose in bud, about 5 mm. diam., resembling flower-buds, surrounded by 5 rounded pubescent bracts. Perianth 2.5 mm. long. Stamens 9-13. Filaments hairy. Fruit 10 mm. long, ovoid, black, supported by the enlarged perianth and enlarged thickened pedicels.

Distribution: Along the foot of the Himalayas, up to 3,000 ft. to Assam and the Satpura Range, Coromandel, Malay Peninsula.—Java, China.

The bark is mildly astringent, and has a considerable degree of balsamic sweetness. It is used by the hill people in the cure of diarrhœa (Ainslie).

The bark is considered stimulant, and after being bruised, applied, fresh or dry, to contusions, and sometimes mixed with milk and made into a plaster (Stewart).

The powdered bark is applied to the body for pains arising from blows or bruises, or from hard work; it is also applied to fractures in animals (Campbell).

Assam: Sualu—; *Bengal:* Barakukurchita—; *Burma:* Ondon, Ungdung—; *Cachar:* Huara—; *Dehra Dun:* Karka, Karkawa—; *English:* Common Grey Mango Laurel—; *Garo:* Bolbek—; *Gond:* Kari, Kjera, Leja, Mendah, Toska—; *Hindi:* Gwa, Kakuri, Kari, Karkawa, Katmarra, Katmedh, Katmoria, Kerauli, Marda, Meda, Papria, Patoia, Randkari, Sangran, Singraf, Singran—; *Kumaon:* Katmara—; *Kurku:* Leinja—; *Lepcha:* Sapot, Sunyok, Suphut—; *Marathi:* Ranamba—; *Michi:* But, Mugasong—; *Nepal:* Kadmero, Kutmero, Patmero, Ratmanti—; *Oudh:* Katmedh, Randkarri—; *Punjab:* Gwa, Harein, Medalakri, Rian—; *Sanskrit:* Gajapippali—; *Santal:* Pojo—; *Tamil:* Maidalagadil, Muchaippeyetti, Pisinbattau—; *Telugu:* Meda, Nara, Naramamidi—; *Uriya:* Kulya, Kurukochhodiya, Mayachhodiya—.

3. **Litsea stocksii** Hook. f. in Hook, f. Fl. Brit. Ind. V (1886) 176.—PLATE 833A.

A small tree. Leaves coriaceous, alternate or subopposite, 10-20 by 5-7.5 cm., elliptic-oblong, obtuse or subacute, glabrous above, glaucous beneath, with slightly revolute margins, penninerved, base acute; main nerves 8-12 pairs, strong, the midrib and nerves glabrous with a slightly yellowish tinge when fresh; petioles 6-13 mm. long, stout, glabrous. Heads of flowers in racemes axillary and from the old scars, the heads consisting of 4-8 flowers (very often 7, six round a central one); peduncles and pedicels pubescent, the latter increasing in fruit; bracts 4-6, concave, pubescent. Perianth hairy, 6- or occasionally in the female 7-8- divided. Stamens 12; filaments glabrous; glands stipitate. Style sublobate. Fruit 1.3 cm. long, ellipsoid, when young green speckled with white, when ripe dark purple, supported on the cup-shaped perianth-tube.

Distribution: W. Peninsula.

A cold infusion of the leaves is mucilaginous, and is used in irritation of the bladder and urethra.

The oil from the seeds is used as an application to sprains and itch.

Marathi : Pisi—.

LINDERA Thunb.

Shrubs or trees. Leaves alternate or subopposite, 3-5-ribbed or penninerved, chartaceous or coriaceous. Flowers unisexual in axillary peduncled or sessile umbellules. Bracts 2-4. Flowers 1-6 or more; peduncles long or short; lobes 6. Stamens 9 or 12; anthers all introrse 2- (rarely 4-) celled, filaments slender. Ovary in female ovoid; style thick; stigma peltate. Fruit globose or ovoid seated on the slightly enlarged perianth-tube with persistent lobes; pedicel slightly thickened.—Species about 60.—India, China, Japan, Malaya, N. America.

Tonic, astringent, and carminative.

L. sericea Bl., *L. strychnifolia* Vill., and *L. thunbergii* Mak. are used medicinally in China; and *L. strychnifolia* Vill. is also used in Malaya.

1. **Lindera neesiana** Benth. in Hook. & Benth. Gen. Pl. III, 164.—PLATE 835A.

A very spicy tree; shoots terete, smooth, usually quite black when dry, often very stout. Leaves glabrous, deciduous, 7.5-18 by 3.8-11.5 cm., membranous, ovate, acute, or acuminate, triple-nerved at the cuneate or cordate base, smooth and reticulated above when dry, more or less glaucous beneath with 4-6 pairs of nerves besides the basal which do not reach the middle of the leaf, and slender distant reticulated ones. Umbels unopened, globose, 8 mm. diam., solitary or clustered, 5-7-flowered, on slender pedicels 8-13 mm.; bracts 4, membranous, glabrous, outer bracts hemispheric, inner narrower; flowers on tomentose pedicels, 6 mm. diam., green. Sepals orbicular, nearly glabrous, very membranous. Stamens 9, filaments short, glabrous, inner 2-glandular. Fruit globose, 4 mm. diam., seated on the unaltered perianth with fragments of the sepals.

Distribution: Temperate Himalaya from Nepal to Sikkim, 6,000—8,000 ft.

The plant yields excellent sassafras (Kurz).
Nepal: Siltimur—.

Cassytha Linn.

Filiform twining parasites adhering to their host by suckers. Leaves consisting of minute scales or 0. Flowers small, hermaphrodite, sometimes dimorphic, spicate, capitate or racemose; bracteoles 3. Perianth-tube short and globose, or (often in the same species) as long as the limb and turbinate; segments 6, the 3 outer smaller. Perfect stamens 9 or 6; filaments of first row eglandular with introrse 2-celled anthers, those of the second row similar or sometimes reduced to staminodes, those of the third row with 2-glandular filaments and extrorse anthers, those of the fourth row replaced by sessile or stipitate staminodes. Ovary globose, free in flower, closely covered by the enlarged perianth in fruit; stigma subsessile, small or capitate. Fruit a small drupe enclosed in the succulent perianth-tube and crowned by the perianth limb. Seed with thin testa; cotyledons ultimately confluent.—Species 15.—Palæotropics.

C. filiformis Linn. is used medicinally in China, Indo China, Madagascar, Mauritius, South Africa, and Senegal; *C. ciliolata* Nees in South Africa.

1. **Cassytha filiformis** Linn. Sp. Pl. (1753) 35.—Plate 835B.

A parasitic herbaceous leafless plant; stems very long, cord-like, twined and matted together, branched, glabrous or pubescent, dark green. Flowers small, sessile, in lax lateral divaricate spikes 1.3-5 cm. long, bracteoles small, rounded, ciliate. Perianth twice as long as the bracteoles; tube short; segments 6 in 2 rows, the 3 outer segments short, rounded, ciliate, the inner oblong, acute, concave, valvate. Fruit about 6 mm. diam., white, globose, smooth, enclosed in the fleshy perianth-tube and crowned with the erect perianth-segments.

Distribution: Throughout India near the coast, Ceylon.—Tropical E. Asia and islands, Polynesia, Australia, tropical Africa and America.

The plant is used as a substitute for *Cuscuta reflexa* (Ayurveda).

The plant is tonic and alterative. When powdered and mixed with sesamum oil it is used to strengthen the hair; mixed with butter and ginger it is used for cleansing inveterate ulcers. The juice mixed with sugar is considered a specific in inflamed eyes.

In Annam, it is considered tonic and given for intestinal disorders. At Tourane, it is commonly prescribed for coughs and pulmonary troubles.

The plant is considered astringent and diuretic in Madagascar. It is used for chronic dysentery, rickets, seborrhœa, gonorrhœa, and leucorrhœa as a decoction.

The plant was formerly used in the Cape Colony as a wash in scald head and for destruction of vermin. Some people pretend that it makes hair grow (Pappe).

Afrikaans: Vrouehaar—; *Annam:* Dang mong, Day to hong, Kim tuyen, Ngoc nu, To hong, To hong do, To hong vang, To hong xanh, Xich cuong—; *Bengal:* Akasbel—; *Bombay:* Akaswel—; *Burma:* Shwaynwaypin—; *Canarese:* Akashaballi,, Beluballi—; *Deccan:* Kotan—; *Hasada:* Hariar roara—; *Hindi:* Amarbeli—; *Hova:* Tsihitafototra—; *La Reunion:* Liane jaune—; *Malayalam:* Akashavalli—; *Marathi:* Amarvela—; *Naguri:* Hariar roar—; *Sanskrit:* Akashavalli—; *Santal:* Alagjari—; *Tagalog:* Malabohoc—; *Tamil:* Erumaikkottan, Indiravalli, Kodikkottan, Kottan, Nandai, Nattai, Pachungottan, Tudakkarupan, Tumbi, Tuttumaikkottan, Vidi, Sanagi—; *Telugu:* Antaravallitige, Nulutega, Pachitige, Sitammavarupogulu, Sitammapogunulu—; *Tulu:* Mudeludantiburu—; *Visayan:* Malabohoc—.

HERNANDIACEAE.

Trees or climbing shrubs. Leaves alternate, simple or pinnate. Flowers bisexual or unisexual, small, white, greenish or pink. Perianth superior; lobes in 2 valvate 3-5-merous whorls or 1 imbricate 4-8-merous whorl. Stamens 3-5 in one whorl, anthers 2-celled dehiscing by valves. Staminodes in 1-2 whorls or 0. Ovary inferior, 1-celled, 1-ovuled. Fruit winged or in an inflated cupule.—Genera 4. Species 25.—Tropics.

The Order is of no therapeutical value.

Hernandia Linn.

Trees. Leaves alternate, ovate peltate 3-7-ribbed. Flowers unisexual, in involucres containing 3 flowers on branch-ends of a panicle, central flower female, laterals male. Involucral bracts 3-4. Perianth-lobes in male 3-6, in female 4-8. Stamens as many; filaments usually with glands at base; anthers 2-celled, dehiscent by valves. Staminodes in females usually 4. Ovary inferior; style included; stigma dilate. Fruit a globular, black, stony nut enclosed in a white inflated involucre with an opening at the top.—Species 10. —Tropics.

The genus is not therapeutically defined.

1. **Hernandia peltata** Meissn. in DC. Prodr. XV, pt. I, 263; Bedd. Fl. Sylv. t. 300.—*H. sonora* Linn. (partim); Wight Ic. t. 1855.

A tall tree. Leaves ovate acute, base round, 7.5-18 cm. long, 5-14 cm. wide; petioles 11.3 cm. long. Panicles 5 cm. long, puberulous. Flowers yellowish. Fruit oblong or globose, 2 cm. through, inflated involucre 7.5 cm. through, open at the tip, creamy white.

Distribution: Malay Peninsula, Andaman Islands, Ceylon, S. India to Polynesia, E. Africa, Madagascar.

The bark and young leaves are cathartic.

The juice of the plant is a powerful depilatory, removing the hair without pain (Beddome).

Betsimisaraka: Mongilahy, Mongy—; *Bicol:* Coloncogon, Malatangantangan—; *Hova:* Amongy—; *Malay:* Bua K'ras laut—; *Mysore:* Uparanthi—; *Philippines:* Tabag—; *Sinhalese:* Palati, Palutu—.

THYMELAEACEAE.

Shrubs or small trees with tough fibrous bark. Leaves alternate or opposite, simple, quite entire. Flowers usually hermaphrodite, in axillary or terminal heads, umbels, clusters, or racemes. Perianth regular, tubular or campanulate, often corolline, frequently with a ring of scales or hairs at the mouth; lobes 4-5, imbricate in bud. Stamens as many or twice as many as the perianth-lobes (rarely half as many), adnate to the perianth-tube, those opposite the lobes usually attached above the alternate ones; filaments short, rarely as long as the anthers; anthers erect, 2-celled, the cells parallel, dehiscing longitudinally. Disk annular, cupular, scaly or obsolete. Ovary superior, 1- (rarely 2-) celled; ovule one in each cell, anatropous, pendulous from near the apex of the cell; style short or long, terminal or eccentric; stigma capitate. Fruit a small berry, drupe, or nut (rarely capsular). Seed solitary or 1 in each cell, pendulous or lateral; albumen fleshy, copious or 0; cotyledons fleshy, usually thick; radical short, superior.—Genera 38. Species 550.—Temperate and tropical regions, especially in Africa.

A. Ovary 1-celled, 1-ovuled. Fruit indehiscent
 1. Perianth-tube cylindric. Style absent. Disk absent ...... DAPHNE.
 2. Perianth-tube cylindric. Style short, stigma large .... WIKSTROEMIA.
 3. Fruiting perianth circumsciss; pericarp thin .... LASIOSIPHON.
B. Ovary 2-celled; cells 1-ovuled. Fruit a loculicidal capsule
 Perianth campanulate. Stamens 10 .... AQUILARIA.

The greater number of the members are acrid, stimulant, and vesicant.

A glucoside, daphnin, and a toxic resin, mezerein, have been isolated from several species of DAPHNE.

OFFICIAL :—*Daphne Gnidium* Linn.=*Thymelœa* Gnidium Allioni, *D. laureola* Linn.=*T. Laureola* Scop. and Allioni, *D. Mezereum* Linn.=*T. Mezereum* Scop. (Portugal); *D. Mezereum* Linn. (Switzerland).

DAPHNE Linn.

Shrubs or small trees. Leaves alternate. Flowers in terminal or lateral sessile or peduncled heads or culsters. Perianth tubular, lobes 4, spreading; scales 0. Stamens 8, 2-seriate, subsessile; anthers dorsifixed. Ovary 1-celled; style very short or 0. Fruit coriaceous or fleshy. Testa crustaceous.—Species 40.—Europe, temperate and subtropical Asia.

Bark vesicant; flowers emetic, laxative, anthelmintic; fruit acrid, puragtive, and anthelmintic.

The following species are used medicinally in Europe—*D. alpina* Linn., *D. cneorum* Linn., *D. gnidium* Linn., *D. laureola* Linn., *D. mezereum* Linn., *D. pontica* Linn.—; In China and Malaya—*D. genkwa* Sieb. and Zucc., *D. odora* Thunb.—; in Malaya—*D. mezereum* Linn.—.

OFFICIAL :—The bark of *D. Gnidium* Linn.=*Thymelœa Gnidium* Allioni, *D. laureola* Linn.=*T. Laureola* Scop. & Allioni, *D. Mezereum* Linn.=*T. Mezereum* Scop. (Portugal); *D. Mezereum* Linn. (Switzerland).

1. **Daphne oleoides** Schreb. Ic. Descr. Pl. Decad. I (1766) 13, t. 7.—*D. mucronata* Royle Ill. 322, t. 81, f. 2.—PLATE 836A.

A much-branched shrub 1.2-2.4 m. high; young shoots clothed with short dense pubescence. Leaves 2.5-5 cm. by 5-10 mm., oblong or linear, narrowed at both ends, mucronate, thick, glabrous, lateral nerves obscure, sessile. Flowers white or tinged with pink, in terminal, ebracteate, 3-9-flowered heads; pedicels minute. Perianth 1-1.8 cm. long, grey-villous outside; lobes oblong, acute or subacute, shorter than the tube. Ovary densley hairy. Fruit ovoid, 7.5-10 mm. long, orange or scarlet, enclosed when young in the perianth tube.

Distribution: W. Himalaya, 3,000—9,000 ft., Baluchistan, Waziristan, Afghanistan and westwards to Italy.

The bark and leaves are used in cutaneous affections and, on the Chenab, the leaves or an infusion are given for gonorrhœa and applied to abscesses (Stewart).

In the Kurram Valley, the roots, after boiling, are used internally as a purgative (Aitchison).

In Baluchistan, the leaves are crushed and used with atta and oil to make a poultice for boils, etc. (Hotson).

Afghanistan: Laghune—; *Baluchistan:* Pipal—; *Bashahr:* Agru, Jiko—; *Kirani:* Pipal—; *Kohlu:* Leghunae—; *Kowas:* Mantrah—; *Pab Hills:* Pipal—; *Punjab:* Channiniggi, Dona, Gandalun, Jikri, Kagsari, Kak, Kansian, Kanthan, Kutilal, Mashur, Shalangri, Shing, Sonai, Swana, Zhi, Zosho—; *Shahrig:* Leghunae—; *Sind:* Pech—; *Zhob:* Leghunae—.

WIKSTROEMIA Endl.

Trees or shrubs. Leaves opposite, rarely alternate. Flowers 2-sexual, in terminal racemes or spikes, ebracteate. Perianth-tube elongate; lobes 4, spreading. Stamens 8, 2-seriate, filaments short. Disk of 1-4 scales. Ovary villous, 1-cellled; style short, stigma large globose. Fruit fleshy and naked, or more dry and included in the base of the perianth. Testa crustaceous, albumen sparing 0.—Species 20.—Indo-Malaya, China.

1. Leaves subcoriaceous, oblong or obovate, round at tip ...... 1. *W. viridiflora.*
2. Leaves membranous, lanceolate, acute or acuminate .... 2. *W. ridleyi.*

The genus is purgative.

W. japonica Miq. is used medicinally in China; *W. viridiflora* Meissn. in Indo China, Malaya, and Madagascar; *W. ridleyi* Gamble in Malaya.

1. **Wikstroemia viridiflora** Meissn. in Denkschr. Regensb. Bot. Gesellsch. III, 306.

A little bushy shrub about 60 cm. tall. Leaves subcoriaceous, crowded, oblong or obovate, round at tip, base cuneate; nerves slender, numerous; 2.5 cm. long, 2 cm. wide or less. Flowers in

very short terminal fascicles, bases hairy. Perianth-tube glabrous, yellow, 1 cm. long, lobes short. Drupe ellipsoid, scarlet, 5 mm. long.

Distribution: Chittagong, Malay Peninsula,—China, Philippines.

In Hongkong, Cochinchina, and Singapore the root bark and the stem bark are considered vesicant and purgative.

In Madagascar, the bark, mixed with salt and ginger, is given as a purgative.

Tagalog: Malasampaga, Salago—; *Visayan:* Salago—.

2. **Wikstroemia ridleyi** Gamble in Kew Bull. (1912) 200.

Shrub, little branched, 60-120 cm. tall. Leaves membranous, lanceolate acute or acuminate; nerves very fine and inconspicuous, 7-12.5 cm. long, 2.5-4 cm. wide; petioles under 2.5 mm. long. Flowers in terminal umbels of 4 to 6 on very short peduncles. Perianth yellow, 13 mm. long, lobes oblong, blunt. Drupe ellipsoid, 6 mm. long, bright red.

Distribution: Malay Peninsula.

The bark is given in a composite drink for small-pox; it is also used in the treatment of boils when pounded and mixed with boiled rice and turmeric as a poultice. In Kelantan, the bark is also used for poisoning river fish; it is ground up, mixed with fine bamboo hairs and decayed copra (the dried kernel of the cocoanut) and then thrown into the water to stupefy fishes.

The leaves possess powerful purgative properties, and one or two of them constitute a full medicinal dose. They are ground up, mixed with a little boiled rice and turmeric, and given by the mouth.

Malay: Depu pelandok, Deru pelandok—.

LASIOSIPHON Fresen.

Shrubs. Leaves opposite or scattered. Flowers hermaphrodite, in dense sessile or pedunculate heads; bracts broad. Perianth often silky-pubescent; tube cylindric, circumscissile above the ovary; lobes 5, spreading, with 5 small scales alternating with them. Stamens 10, attached to the throat below the scales in 2 rows, the

upper or all shortly exserted; filaments very short; anthers oblong or linear. Disk 0 or shortly annulate. Ovary superior, 1-celled; ovule solitary, pendulous; style long, filiform; stigma capitate. Fruit small, dry, included in the perianth-tube; pericarp membranous. Seed with a crustaceous testa.—Species 20.—Palæotropics.

The genus exhibits vesicant and toxic properties.

L. anthylloides Meissn., *L. kraussii* Meissn., *L. linifolius* Dcne., *L. meisnerianus* Endl. are used medicinally in South Africa.

1. **Lasiosiphon eriocephalus** Decaisne in Jacq. Voy. Bot. (1844) 148.—*Gnidia eriocephala* Meissn.; Wight Ic. t. 1859.—*G. sisparensis* Gardn. in Calc. Journ. Nat. Hist. 1; Wight Ic. t. 1860. PLATE 837.

A much-branched shrub, sometimes a small tree, with mottled bark. Leaves subsessile, 5-7.5 by 2-2.5 cm., oblong-lanceolate, actue. apiculate, glaucous and glabrous above, glabrous or silky beneath, base acute; petioles very short. Flowers yellow, nearly sessile, in erect dense terminal heads 2.5-3.8 cm. diam., surrounded at the base by an involucre of large imbricate elliptic-oblong, acute, silky-villous deciduous bracts. Perianth densely silky-villous; tube 1 cm. long; lobes 2.5-3 mm. long, oblong, obtuse, flat, with a linear usually 2-fid scale at each division. Anthers almost sessile. Fruit 1-1.3 cm. long, ellipsoid-oblong, pointed, enclosed in the perianth.

Distribution: W. Peninsula, Ceylon.

A powerful vesicant, but uncertain in its action.

The bark is used to poison fish.

In the Deccan, the leaves are applied to contusions, swellings, etc. (B. D. Basu).

Bombay: Ramatta, Rametha—; *Canarese:* Enujariga, Mukurgal, Mukute, Rami—; *English:* Woolly-headed Gnidia—; *Kadir:* Nanja—; *Malayalam:* Nanja—; *Marathi:* Rametta, Rami, Ramita—; *Pulaiya:* Malainanja—; *Sinhalese:* Naha—; *Tamil:* Malaiviralan, Nachannar—.

AQUILARIA Lamk.

Trees. Leaves alternate; nerves slender, parallel. Flowers 2-sexual, in axillary and terminal peduncled or subsessile umbellules,

ebracteate. Perianth campanulate; lobes 5, broad, spreading; scales above the stamens 5, hairy, connate at the base. Stamens 10; anthers subsessile, oblong; connective broad. Disk 0. Ovary subsessile, villous, perfectly or imperfectly 2-celled; stigma large, subsessile. Capsule compressed, oblanceolate or obovate, loculicidal; pericarp coriaceous or hard and woody. Seeds ovoid, with a long tail-like appendage, testa crustaceous, inner coat thick, albumen 0.—Species 8.—Indo-Malaya, China.

A. agallocha Roxb. is used medicinally in China, Cambodia and Malaya.

1. **Aquilaria agallocha** Roxb. Fl. Ind. II (1832) 422; Royle Ill. 173, t. 36, f. 1.—PLATE 836B.

An evergreen large tree, the young shoots pilose. Leaves linear-lanceolate to lanceolate and obovate-oblong, on a 2 mm. long petiole, acute or rounded at the base, 5-9 cm. long, caudate-acuminate, thin-chartaceous, slightly appressed-pilose on the nerves beneath or glabrous, silky-glossy, faintly parallel-nerved. Flowers rather small, greenish, on very slender pilose pedicels 4-6 mm. long or longer, forming sessile or shortly peduncled umbels arising laterally from the younger branchlets; perianth 5 mm. long, slightly hairy outside, densely villous inside, especially the lobes; perianth-scales oblong, villous, alternating with the stamens and as long; filaments red at apex. Ovary tawny-tomentose. Capsules obovate-cuneate, slightly compressed, about 2.5 cm. long, densely tawny or yellowish tomentose, in a dried state shrivelled and wrinkled.

Distribution: E. Himalaya, Assam, Martaban Hills.

The wood is pungent, bitter, fragrant, oleagenous; heating, alterative, tonic, carminative; useful in "kapha" and "vata", diseases of the ear and skin, hiccough, leucoderma, eye troubles (Ayurveda).

The wood is fragrant with a bad taste; laxative, tonic, carminative, stomachic, diuretic, aphrodisiac; useful in chronic diarrhœa, bad taste in the mouth, diseases of the liver and intestines, bronchitis, asthma, vomiting; strengthens the brain; helps to stabilize the foetus in utero (Yunani).

The fragrant resinous substance is considered cordial. It has been prescribed in gout and rheumatism.

It is a delightful perfume, serviceable in vertigo and palsy, and the powder is useful as a restrainer of the fluxes and vomiting. In decoction, it is useful to allay thirst in fever.

The wood is a preventive against fleas and lice, and in the form of a powder is rubbed into the skin and the clothes. In medicine, aloes wood is considered a stimulant and cordial in gout, rheumatism and paralysis, also as a stimulant astringent in diarrhœa and vomiting. It is taken internally as a tonic in doses of ten to sixty grains.

In China, tonic, stimulant, carminative, and aphrodisiac properties are ascribed to the wood. In Cambodia, it is considered febrifuge and is administered in paludism.

The wood is prescribed in the treatment of snake-bite and scorpion-sting (Charaka, Sushruta); but it is not an antidote to either snake-venom (Mhaskar and Caius) or scorpion-venom (Caius and Mhaskar).

Arabic: Agarehindi, Aud, Audehindi, Ud, Udehindi—; *Assam:* Sasi—; *Bengal:* Agaru, Aggar, Ugar—; *Bombay:* Hindiagara—; *Burma:* Akyau—; *Cambodia:* Chan Krasna, Krasne—; *Canarese:* Agaru—; *Chinese:* Cheng Ch'en Chi, Ch'en Hsiang, Mi Hsiang—; *English:* Agallochum, Aglia, Akgaw, Aloes Wood, Calambac, Eagle Wood, Lign Aloes, Lignum Aloes—; *French:* Aquilaire—; *German:* Adlerholz—; *Gujerati:* Agar—; *Hindi:* Agar—; *Malay:* Akayau, Garu, Kayu, Ud—; *Malaya:* Sam chit—; *Persian:* Agar, Agrehindi—; *Sanskrit:* Agaru, Agnikashtha, Anaryaka, Asara, Bhringaja, Jonk, Kashthaka, Krimigandha, Krimija, Krishna, Laghu, Loha, Lohakhya, Pataka, Pichhila, Pravara, Rajarha, Vanshika, Varnaprasadana, Yogaja—; *Siam:* Nwahmi—; *Sinhalese:* Kihay, Sinnah—; *Tamil:* Agar, Aggalichandana—; *Telugu:* Agru—; *Urdu:* Agar—.

ELAEAGNACEAE.

Trees or shrubs with copious silvery or brown scales. Leaves alternate or opposite, quite entire; stipules 0. Flowers small, regular, hermaphrodite or dioecious, axillary (rarely from the leafless nodes), fasciculate, spicate or racemose; bracts small, deciduous. Perianth in the hermaphrodite or female flowers tubular, constricted above the ovary, persistent below, deciduous above; limb 2-4-lobed (rarely truncate). Stamens in hermaphrodite flowers adnate to the throat of the perianth, in male flowers adnate to the base of the perianth, 4 alternate with, or 8 both opposite to and alternate with the perianth-lobes; filaments free, usually short; anthers oblong, 2-celled, the cells parallel, contiguous, dehiscing longitudinally; staminodes in female flowers 0. Ovary free, 1-celled; ovule solitary, erect, basal, anatropous; style terminal, linear or dilated above, oblique; stigma lateral. Fruit a nut closely covered by the thickened berry-like perianth-base; pericarp membranous. Seed erect; testa hard; albumen scanty or 0; cotyledons thick, fleshy; radicle inferior, very short.—Genera 3. Species 25.—Chiefly on steppes and coasts of the N. hemisphere.

1. Perianth 4-fid .... ELAEAGNUS.
2. Perianth of male flowers 2-partite membranous, of female flowers bifid .... HIPPOPHAE.

Subacid and antiperiodic. Useful in lung affections.

ELAEAGNUS Linn.

Trees or shrubs often silvery with a scaly or stellate tomentum. Flowers hermaphrodite, axillary, shortly petiolate, solitary or 2-3-nate, or sometimes fasciculate on short leafless or leafy branchlets; bracts 0. Perianth with oblong or globose persistent base narrowed above the ovary, then campanulate or infundibuliform, valvately 4-fid at the apex, deciduous, usually with a prominent ring above the constriction within. Stamens 4, on the mouth of the perianth; filaments short. Ovary 1-celled; style linear, included, slightly dilated above; stigma lateral. Fruit enclosed in the persistent accrescent berried or rarely dry perianth-base; pericarp thinly membranous. Seed with hard

shining testa; albumen 0 or very scanty.—Species 20.—Asia, Europe, N. America.

A. Endocarp hard bony .... 1. *E. hortensis.*
B. Endocarp ribbed coriaceous, closed inside with a dense felt of white hairs
 1. Fruit 6 mm. long .... 2. *E. umbellata.*
 2. Fruit 2.5-3.8 cm. .... 3. *E. latifolia.*

Useful in lung affections and in malignant fevers.

E. hortensis Bieb. is used medicinally in Spain, *E. pungens* Thunb. in China.

1. **Elaeagnus hortensis** M. Bieb. Fl. Taur. Cauc. II, 112.—*E. angustifolia* Linn. Sp. Pl. 121.—PLATE 839A.

A tree, 3.6-9 m. high, often spinous, young silvery; branches dark brown. Leaves deciduous, 2.5-7.5 cm., obtuse, ovate-oblong or linear-oblong, silvery beneath, nerves faint; petiole 6 mm. Flowers pedicelled, 1-3-nate, yellow, fragrant. Perianth 4-6 mm. long, silvery, campanulate above, teeth triangular-ovate. Style glabrous. Fruit 2 cm. long, ellipsoid-oblong, red, dry or fleshy, endocarp thick, bony.

Distribution: W. Himalaya, 5,000—10,500 ft., Baluchistan.—Westwards to Spain, W. and Central Asia to China.

The oil from the seeds with syrup as an electuary is recommended in catarrhal and bronchial affections (Honigberger).

The juice of the flowers is used in Spain as a cure for malignant fevers.

Afghanistan: Sanjata, Sanjit, Santij—; *Barkhan:* Sinjli, Sinzalai—; *Bori:* Sinjli, Sinzalai—; *English:* Bohemian Olive, Jerusalem Willow, Oleaster—; *French:* Chalef à feuilles étroites, Olivier de Bohême, Olivier des sables, Olivier sauvage—; *Kharan:* Sinjit—; *Kohlu:* Sinzalae—; *North-Western Provinces:* Shiulik—; *Persian:* Zinzeid—; *Pishin:* Sinjid—; *Pushtu:* Sanjit, Sinjit—; *Sanjawi:* Sinjli, Sinzalai—; *Shahrig:* Sinzalae—; *Tibet:* Sirshing, Sirsing—; *Toba:* Sinjid—; *Zhob:* Sanzalai—.

2. **Elaeagnus umbellata** Thunb. Fl. Jap. (1784) 66, t. 14.—Plate 839B.

A deciduous shrub sparingly armed with short straight thorns; shoots and young branches clothed with silvery scales. Leaves alternate, 2.5-7.5 by 1.3-2.5 cm., elliptic-oblong, acute, acuminate or obtuse, base rounded or narrowed, dotted on the upper surface with stellate hairs when young, soon becoming glabrous, persistently silvery scaly beneath; petiole 5-7.5 mm. long, silvery. Flowers 1 cm. across, dull yellowish-white, fragrant, appearing with the young leaves in few-flowered axillary clusters; pedicels 2.5-3.8 mm. long in flower, 5-7.5 mm. long in fruit, silvery. Perianth-tube 1 cm. long, silvery-scaly outside, constricted above the ovary, tubular-funnel-shaped; lobes 4, ovate, acute, 3.8 mm. long, valvate in bud. Stamens 4, inserted in the throat of the perianth-tube. Style included. Fruit 7.5 mm. long, narrowly ovoid, succulent, covered with silvery scales; nut bony, ribbed.

Distribution: Temperate Himalaya, from Kashmir to Nepal, 3,000—10,000 ft.—Afghanistan, N. China, Japan.

The seeds are said to be used as a stimulant in coughs, the expressed oil in pulmonary affections, and the flowers as a cardiac and astringent.

Almora: Girvai—; *Bashahr:* Rib—; *Garhwal:* Geowain—; *Jaunsar:* Gehain, Ginroi—; *Pangi:* Chindar—; *Punjab:* Bammerwa, Ghain, Ghirwain, Kankoli, Kankolmirch—.

3. **Elaeagnus latifolia** Linn. Sp. Pl. (1753) 121; Wight Ic. t, 1856.—Plate 840.

A large, much-branched, usually scandent shrub, often running over high trees; trunk sometimes 10 cm. or more diam., young shoots scurfy with rust-coloured shining scales; stems and branches more or less spinous; bark smooth with corky excrescences. Leaves numerous, variable, thin or coriaceous, 3.8-10 by 2.2-5 cm., from broadly elliptic to elliptic-lanceolate, obtuse, acute or acuminate, the upper surface pale green clothed with small whitish scurfy scales, the lower surface glistening silvery-white, margins more or less revolute, base acute or rounded; petioles 6-10 mm. long, scaly. Flowers usually many in a

cluster, straw-coloured; pedicels clothed with silvery scales. Perianth 8 mm. long, covered with silvery scales; lobes ovate, acute, 3 mm. long, spreading. Style hairy. Fruit nearly 2.5 cm. long, ellipsoid, with 8 strong blunt ribs, crowned by the top of the perianth, pinkish, with small whitish scabrous spots; mesocarp succulent, edible; putamen white, clothed inside with white wool. Seed 2 cm. long.

Distribution: Widely distributed throughout the hilly parts of India, Ceylon.—Malay Islands, China.

In Sind and Punjab, the flowers are considered cardiac and astringent (Stewart).

The fruit is used medicinally in Kashmere as an astringent (Griffith).

Bengal: Guara—; *Bombay:* Ambgul, Nagri, Nurgi—; *Burma:* Mingu—; *Canarese:* Haligeballi, Hejjala, Hittele, Hulige, Hunaseballi, Kerahuli, Melekollija—; *Garhwal:* Loharu—; *Garo:* Sheushong—; *Kumaon:* Ghiwain, Mijhaula—; *Magahi:* Kamboong—; *Malayalam:* Kayalampuvalli—; *Marathi:* Ambgul, Nildook, Nurgi—; *Nepal:* Goeli, Jarila, Malindo—; *North-Western Himalayas:* Ghiwai, Nigali—; *Sinhalese:* Katuembilla, Welembilla—; *Tagalog:* Alingaro—; *Tamil:* Kulangi, Kulari—; *Uriya:* Dibaguda, Pihta—.

HIPPOPHAE Linn.

Dioecious shrubs or small trees, often spinescent. Leaves alternate, narrow. Male flowers in axillary clusters, bracts deciduous; perianth-segments 2, opposite; stamens 4. Female flowers solitary; perianth tubular, 2-dentate. Fruit a membranous utricle enclosed in the succulent perianth. Seed oblong, testa crustaceous, shining, albumen scanty.—Species 2.—N. temperate regions of the Old World.

1. Leaves 1.3-5 cm. long .... 1. *H. rhamnoides.*
2. Leaves 5-10 cm. long .... 2. *H. salicifolia.*

Useful in lung complaints.

1. **Hippophae rhamnoides** Linn. Sp. Pl. (1753) 1023.—PLATE 838A.

A stiff densely branching deciduous shrub 15-60 cm. high with erect or decumbent stems up to 2.5 cm. diam., the branches frequently

dying back at the tips and becoming spinescent. Bark smooth, ashy or silvery-grey, or finally rough and dark brown. Twigs and young shoots more or less densely clothed with silvery-brown scales, the youngest shoots puberulous. Leaves 0.9-1.8 cm. by 2.5-5 mm., densely clothed on both surfaces with silvery-brown scales, chiefly brown on the undersurface, minutely pubescent when young. Petiole 0. Flowers appearing with the new leaves. Perianth-lobes of male flowers orbicular, concave, less than 2.5 mm. long, scaly on the outside. Fruit 7.5 mm. long, globose, scaly, crowned with the persistent style.

Distribution: N.-W. Himalaya, 7,000—15,000 ft.—Afghanistan and westwards to N. and Middle Europe, N. and Central Asia.

A decoction of the berries is used in France for cutaneous eruptions.

The plant is given in lung complaints by the Tibetans and the Tartars.

Bhotia: Tarwa—; *Dutch:* Duindoorn—; *English:* Sallow-thorn, Sea Buckthorn—; *French:* Argousier, Argoussier—; *German:* Stechdorn—; *Ladak:* Sirna, Tasru, Tsarana, Tsarap—; *Lahoul:* Sirna, Tasru, Tsarana, Tsarap—; *North-Western Provinces:* Chuk, Chuma, Dhurchuk, Tarwa—; *Pangi:* Suak—; *Piti:* Sirna, Tasru, Tsarana, Tsarap—; *Punjab:* Amb, Bautphut, Kalabisa, Kando, Milech, Miles, Rul, Sirma, Suts, Starbu, Tarru, Tsarap, Tsarmang, Tsarmaniechak, Tserkar, Tswak—; *Tibet:* Starbu—; *United Provinces:* Chuma, Dhurchuk, Tarwa—.

2. **Hippophae salicifolia** D. Don Prodr. Fl. Nep. (1825) 68.—Plate 838B.

A small deciduous tree up to 2.4 m. girth and 9 m. high with rounded spreading crown, often spinescent when young. Bark reddish brown, with deep longitudinal furrows, very rough. Blaze 2.5 cm., fibrous, pale yellow or yellowish brown. Twigs clothed with rusty-brown scales. Leaves 3.8-10 by 0.7-1.5 cm., oblong-lanceolate, stellately pubescent above when young becoming bluish green and with varying amount of pubescence when mature, canescent with dense short stellate tomentum beneath, the midrib beneath pale rusty-brown

with a few scales mixed with the hairs. Petiole about 2.5 mm. long. Flowers appearing just before or with the young leaves. Perianth of the male flowers scaly. Fruit 6 mm. long, ovoid, yellow, with scattered scales, very acid to the taste, remaining long on the tree.

Distribution: Temperate Himalaya, from Kunawar to Kumaon, 7,000—11,000 ft.

In the Punjab, the fruit is given in cases of lung disease.

Almora: Chu—; *Bassahir:* Surch—; *Bhutan:* Lhala—; *Garhwal:* Ames, Chuk—; *Lepcha:* Lhala—; *Nepal:* Ashuk—; *Punjab:* Chuma, Dhurchuk, Kalabis, Surch, Suts, Tarwachuk, Tserdkar—.

LORANTHACEAE.

Evergreen shrubs usually parasitic on the branches of trees; stems much-branched, often jointed. Leaves usually opposite, coriaceous, entire, sometimes absent; stipules 0. Flowers hermaphrodite or 1-sexual, racemose, spicate, capitate or fasciculate; bracts usually scale-like; bracteoles usually 2. Perianth simple or double; sepals or simple perianth when sepaloid adnate to the ovary; limb annular or cupular, entire or shortly toothed; petals or simple perianth-segments when petaloid 3-8- (rarely 2-) valvate, free or more or less connate in a tube or in a sheath split on the upper side. Stamens as many as and opposite to the corolla-lobes, usually adnate to them; filaments filiform; anthers usually 2-celled. Ovary inferior, at first apparently solid, at length 1-celled; ovule solitary, erect, adnate throughout to the walls of the ovary; style short or long; stigma simple. Fruit a 1-seeded berry or drupe. Seed adnate throughout to the pericarp; albumen fleshy or 0; embryo straight; radicle superior.—Genera 30. Species 520.—Tropical and temperate regions.

1. Flowers bisexual .... LORANTHUS.
2. Flowers unisexual .... VISCUM.

Bark astringent; in some cases the fruit is emollient.

Loranthus Linn.

Branched shrubs, parasitic on the branches of trees. Leaves opposite (rarely alternate), entire, usually thick and fleshy or coriaceous. Flowers hermaphrodite, usually coloured, spicate, racemose or cymose, axillary or on old nodes (rarely terminal); bracts concave or oblique, cupular; bracteoles 2, free or connate with the bract or 0. Perianth double. Calyx-tube adnate to the ovary; limb short, truncate or 4-6-toothed, or obsolete. Petals 4-6, valvate, free or more or less connate in a tube with spreading tips, often split down one side. Stamens 4-6, adnate to the petals; filaments filiform or thickened; anthers ovate-oblong or linear, adnate or versatile, the cells parallel. Disk 0. Ovary inferior, 1-celled; ovule solitary; style columnar, filiform (rarely twisted); stigma entire, terminal, obtuse or capitate. Fruit a berry or drupe, globose, ovoid or oblong. Seed adnate to the pericarp; testa 0; albumen copious, fleshy or 0; embryo usually fleshy.—Species 350.—Tropics and subtropics of the Old World.

1. Leaves 3.8-10 cm. .... 1. *L. elasticus.*
2. Leaves 7.5-25 cm. .... 2. *L. falcatus.*

The genus is mostly used in the treatment of diseases of women. *L. europaeus* Linn. is used in Europe; *L. yadoriki* S. & Z. in China; *L. pentagona* DC. in Nigeria; *L. dregei* E. & Z. in Zululand.

1. **Loranthus elasticus** Desr. in Lam. Encyc. Méthod. III (1789) 599; Wight Ic. t. 343.

Much-branched, glabrous; branches dichotomous, pendulous, terete, swollen at the joints, the young ones green. Leaves opposite, sessile or nearly so, very thickly coriaceous, 3.8-10 by 2-4.5 cm., ovate, elliptic, suborbicular or oblong-lanceolate, obtuse, dark-green and smooth above, glaucous beneath, base usually acute, the very young leaves often red; nerves 3-5, obscure. Flowers sessile, fascicled at the nodes; bracts red, broadly ovate, about 1.2 mm. long. Calyx red, 3 mm. long; tube globose; limb cylindric, entire, about 1.2 mm. long. Corolla 2.5 cm. long, the lower part in bud obtusely 5-angled, the upper part cylindric; tube split, greenish-white with bright green veins; lobes 5, spirally coiled, narrowly linear, longer than the tube.

Stamens 5; filaments red; anthers 3 mm. long, narrow. Style very long, red; stigma fusiform. Berry subglobose or ovoid, sessile, pink, 13 mm. long; albumen white, 5-toothed at the apex; embryo club-shaped, the radicle-end covered with minute knobs.

Distribution: W. Peninsula. Apparently endemic.

The leaves are used to check abortion; also in vesical calculi and kidney affections.

Tamil: Andagan, Kuruvichai, Marattuvottu, Pulluri, Pulluruvi, Sigari, Sigariyandam—.

2. **Loranthus falcatus** Linn. f. Suppl. (1781) 211.—*L. longiflorus* Desr. in Lam. Encyc. Méthod. III (1789) 598; Wight Ic. t. 302.

A large bushy usually glabrous branch-parasite; bark grey, smooth; young parts glabrous or nearly so. Leaves thick, coriaceous, usually opposite, 7.5-18 by 2-10 cm., very variable in shape and venation, ovate, elliptic, or linear-oblong, obtuse; midrib prominent, usually red, the secondary nerves obscure; petioles 3-13 mm. long, stout. Flowers in short spreading stout axillary unilateral racemes often 2 from an axil; pedicels short; bract 1.6 mm long, broadly ovate, subacute, concave. Calyx 4 mm. long, more or less hoary-tomentose; tube cylindric; limb cupular, truncate, or shortly 5-toothed. Corolla 2.5-5 cm. long, split at the back; tube curved, slightly widened upwards, scarlet or orange or less commonly pink or white; lobes 5, linear, 1 cm. long, reflexed, green or yellowish. Anthers linear, equal in length to the free portion of the filament. Style slender, quadrangular; stigma rather small, subglobose. Berry 8-13 mm. long, ovoid-oblong, pink, smooth, crowned by a cup-shaped calyx. Albumen white, copious, with 5 linear teeth at the top surrounding the green embryo which resembles a small nail 6 mm. long with a flattened head (the radicle).

Distribution: More or less throughout India, Burma, Ceylon.—Australia.

The bark has narcotic properties. It is used in wounds and menstrual troubles, and also as a remedy in consumption, asthma, and mania.

The bark is used as a substitute for betel-nut.

Banda: Patha—; *Bengal:* Buramanda—; *Bhil:* Kaurak—; *Burma:* Kbyeepaung—; *Canarese:* Bandanike, Kesarakabandanike, Muddupa—; *Central Provinces:* Banda—; *Gujerati:* Vando—; *Hindi:* Banda—; *Lambadi:* Banda—; *Lepcha:* Prusti—; *Malayalam:* Itti, Ittukanni, Kannirattinmelpulluni, Pulunni, Utia—; *Marathi:* Vanda—; *Nepal:* Ajeru—; *Punjab:* Amut, Banda, Pand, Panda, Panand—; *Sanskrit:* Vanda, Vrikshabhaksha, Vrikshadani, Vriksharuha—; *Santali:* Banda—; *Saora:* Bajinika—; *Tamil:* Kamaricham, Pulluri, Pulluruvi, Sangattanmarattubulluruvi, Uchi, Uruvi—; *Telugu:* Badanika, Bajinika, Jiddu, Velagabadanika, Yelinga—; *Uriya:* Bridhongo—.

Viscum Linn.

Shrubs semiparasitic on trees. Leaves opposite, flat, and thick, or reduced to small scales or teeth. Flowers unisexual, fasciculate (rarely solitary), in the axils or on nodes (rarely terminal); bracts usually small; bracteoles 2, free or connate (rarely obsolete). Perianth-lobes in male flowers short and solid, in female flowers adnate to the ovary; limb 3-4-lobed, the lobes usually deciduous. Stamens 3-4; anthers broad, sessile, adnate to the perianth-lobes, dehiscing introrsely by numerous pores, the cells confluent. Ovary in female flowers inferior, 1-celled; ovule solitary; stigma sessile or subsessile, large, pulvinate. Fruit a succulent berry with soft viscid mesocarp. Seed adnate to the pericarp; albumen copious, fleshy; embryo terete, enclosed in the albumen, solitary, or sometimes 2 embryos in each seed.—Species 20.—Old World.

A. Branches leafy
 Leaves exceeding 2.5 cm. long
 1. Leaves obovate-cuneate, tip rounded .... 1. *V. album.*
 2. Leaves obliquely ovate or falcate, acute .... 2. *V. monoicum.*
 3. Leaves equally elliptic or elliptic-lanceolate, obtuse .... 3. *V. orientale.*
B. Branches leafless
 Stems and branches flattened, contracted at the nodes .. 4. *V. articulatum.*

V. album Linn., *V. cruciatum* Sieb., *V. laxum* Boiss. and Reut. are used medicinally in Spain; *V. capense* Linn. fil., *V. pauciflora* Linn. fil., *V. rotundifolium* Thunb. in South Africa.

1. **Viscum album** Linn. Sp. Pl. (1753) 1023.—PLATE 841B.

Yellowish green, bushy, forming tufts 0.6-0.9 m. diam.; stems terete, branches jointed, dichotomous. Leaves variable, usually 2.5-5 cm. long, oblong, broad or narrow, usually with obtuse tip and cuneate base, glabrous, thick and fleshy, obscurely 3-5-nerved, sessile. Flowers dioecious, sessile, in clusters of 3 or 5 in the forks of the branches, supported by cup-shaped slightly ciliate bracts; terminal flower solitary, the lateral in opposite or decussate pairs. Perianth-segments 3-4, triangular, thick, acute, deciduous. Berry 7.5 mm. diam., subglobose, white, translucent.

Distribution: Temperate Himalaya, from Kashmir to Nepal, 3,000—7,000 ft., Waziristan, westward to the Atlantic, N. Asia to Japan.

The berry is sweet, sour; laxative, tonic, aphrodisiac, diuretic, cardiotonic, detergent, maturant; useful in inflammations, biliousness. lumbago, piles, tumours, diseases of the spleen, mental weakness and fatigue; removes phlegm and bad humours from the body (Yunani).

In the Punjab, the plant is given in enlargement of the spleen, in cases of wound, tumour, diseases of the ear, etc., (Honigberger).

The plant is still occasionally used in Spain, as an antispasmodic and diaphoretic; it is also given in epilepsy.

Afghanistan: Turapanli—; *Arabic:* Dibki—; *Catalan:* Visch—; *Danish:* Fugellim, Mestertjene—; *Dutch:* Marentakken—; *English:* Devil's fuge, Mistletoe, Spectre's Wand—; *French:* Avi, Blondeau, Bois de la Sainte-Croix, Bouchon, Breton, Gui, Gui blanc, Gui de chêne, Gui des druides, Pomme hémorrhoidale, Verquet—; *German:* Affolter, Bierbaeumeniwintergruen, Birkenbluete, Birkenmischling, Birnbaummistel, Birrenaespel, Donnerbesen, Druidenmistel, Eichenmistel, Ekenmispel, Ginster, Heiligheu, Hexenbesen, Kenster, Kinster, Kluster, Knister, Kraigensluder, Kreuzholz, Kumtenholz, Kunstenholz, Leimmistel, Lemknorzen, Lohholz, Marentaken, Marentoken, Mistel, Mistelholz, Offolderholz, Offolter, Vogelholz, Vogelleim, Vogelleimholz, Wintergruenholz, Wintermistel—; *Greek:* Ixos—; *Hindi:* Ban, Banda—; *Hungarian:* Lep—; *Italian:* Guastrice, Pania, Scoaggine, Vischiaia, Vischio, Visco—; *Jaunsar:* Chulukabanda—; *Kulu:* Rini—; *Languedoc:* Bé dé poumié—; *Nepal:* Harchur, Hurchu—; *Polish:* Jemiel, Jemiola—; *Portuguese:* Visco—; *Punjab:* Ahalu,

Bamba, Banda, Bhangra, Jerra, Kahbang, Reng, Reori, Ringi, Rini, Wahal—; *Rawalpindi:* Perbikh—; *Roumanian:* Visc—; *Russian:* Omela, Ptitchiy kley—; *Spanish:* Muerdago, Visco—; *Sutlej:* Runath—; *Swedish:* Mistel—; *Urdu:* Kishmishkawali, Muizakeasli—.

2. **Viscum monoicum** Roxb. Fl. Ind. III (1832) 763.—Plate 841A.

A large parasitic shrub. Branches slender, smooth, terete, slightly swollen at the nodes. Leaves shortly petioled, rather thin and usually drying black, 2.5-12.5 cm. long, variable in width, obliquely ovate or lanceolate, often falcately curved, acute or acuminate; basal nerves 3-5, prominent. Flowers minute, monoecious, greenish, arranged in axillary sessile or shortly stalked usually 3-flowered fascicles; central flower of each fascicle usually male; bracts truncate, apiculate. Perianth-lobes 3 or 4, triangular-oblong. Berry 6-13 mm. long, oblong, narrowed at both ends.

Distribution: Oudh, Sikkim, Khasia Hills, Bihar, Chota Nagpur, S. India, Ceylon, Burma.

The powder of the dry leaf was used as a substitute for strychnine and brucine in the Hospital of the Medical College, Calcutta, with complete success, in doses of one to three grains thrice daily (O'Shaughnessy).

Bengal: Banda, Pargatcha—; *Deccan:* Kuchlekisonkan—; *Hasada:* Parasusuam—; *Hindi:* Kuchlekamalang—; *Naguri:* Kargelosum, Kargelungsum—; *Santal:* Petchamrabanda—; *Tamil:* Pulluruvi—; *Telugu:* Badanika, Bajinika, Kadisebadanika, Pullurivi—; *Uriya:* Monjodomo—.

3. **Viscum orientale** Willd. Sp. Pl. IV (1805) 737.—Plate 842.

Stems much-branched; branches terete or angular and grooved, sometimes whorled, thickened at the nodes; twigs slender, glabrous. Leaves numerous, 3.2-5 by 1.3-2.5 cm., elliptic or elliptic-lanceolate, obtuse, glabrous, base tapering into a short often obscure petiole; basal nerves 3-5. Flowers in axillary sessile or shortly pedunculate clusters of 3-5, monoecious. Calyx-limb quite absent. Corolla-lobes 3 or 4, triangular, acute, deciduous. Berry ovoid or subglobose,

6 mm. long. Albumen green, biconvex, firm; embryo minute, comma-shaped; radicle green, slightly thickened at the top.

Distribution: Bengal, Bihar, Chittagong, Burma, W. Peninsula, Ceylon.—Malay Islands, China, New Guinea, Australia.

In Chota Nagpur, this plant is largely used medicinally, and is believed to derive some particular property from the tree on which it is found. It is employed in as many different diseases as the trees on which it is found (Campbell).

Gond: Gurbel—; *Hindi:* Banda—; *Kolami:* Banda—; *Santali:* Banda—; *Telugu:* Chandrabadanika, Sundarabadanika—.

4. **Viscum articulatum** Burm. Fl. Ind. (1768) 311.—PLATE 843.

A much-branched parasitic leafless shrub forming pendulous tufts 15 cm. to 0.9 m. long. Branches jointed, the internodes 2.5-5 cm. long, flattened somewhat narrowed at each end, readily disarticulating, pale green when fresh, yellowish brown when dry and longitudinally furrowed. Flowers monoecious, very minute, 3-4-merous, very shortly stalked, 1-6 together in fascicles at the nodes, each with a cupular bract at the base. Perianth of male flowers reflexed. Female flowers 2-bracteolate, the perianth-lobes erect, triangular. Berry 6 mm. diam., subglobose, greenish yellow, smooth.

Distribution: Himalaya, Assam, Khasia Hills, Burma, Central Provinces, W. Peninsula, Ceylon, Malay Peninsula.—Malay Archipelago, Java, Australia.

The herb is bitter, acrid, cooling, sweetish; alexipharmic, aphrodisiac, alterative; useful in "kapha", "vata", diseases of the blood, ulcers, epilepsy, biliousness (Ayurveda).

In Chota Nagpur, a preparation from the plant is given in fever attended with aching limbs.

Banda: Patha—; *Bengal:* Mandada, Paragachha, Vandu—; *Central Provinces:* Banda—; *Gujerati:* Vando—; *Hindi:* Bandala, Budu, Pan, Pand, Pudu, Vadaka, Vande—; *Marathi:* Banda, Kamarukha—; *Nepal:* Harchur, Hurchu—; *Sanskrit:* Gandhamadini, Jivantika, Kamavriksha, Kamini, Karuruha, Kesharupa, Nilavalli,

Nilavarna, Padapruha, Parapushta, Parashraya, Parawasika, Putrini, Shekhara, Shyama, Sevya, Tarubhuk, Tarurohini, Tarustha, Upadi, Valdaka, Vanda, Vandaka, Vandya, Vashini, Vrikshabhaksha, Vrikshadini, Vriksharuha—; *Santali:* Katkomjanga—; *Telugu:* Kattabadanika—; *Thana:* Harmore—.

SANTALACEAE.

Trees, shrubs, or herbs often semiparasitic on roots. Leaves alternate or opposite, entire, sometimes scale-like or 0; nerves inconspicuous; stipules 0. Flowers hermaphrodite or 1-sexual, regular, usually small, in simple or compound cymes; bracts usually small, sometimes leafy; bracteoles 2, free or connate, subopposite, sometimes 1 or both obsolete. Perianth superior or inferior, simple, green or coloured; limb 3-8 -toothed, -lobed or -partite; lobes often with a tuft of hairs behind the anthers. Stamens as many as and opposite to the perianth-lobes, attached above (rarely on) the perianth-base; filaments filiform or wide; anthers 2-celled, dehiscence longitudinal, introrse or lateral. Disk epigynous or perigynous. Ovary 1-celled, inferior; ovules 2-3, adnate to or pendulous from a central column; style usually short; stigma entire or 3-6-lobed. Fruit a nut or drupe. Seed globose or ovoid, smooth, rugose or sulcate; testa thin or obsolete; albumen copious, fleshy; embryo small, terete; radicle superior.—Genera 26. Species 250.—Temperate and tropical regions.

1. Leaves opposite. Stamens with interposed processes. Flowers bisexual. Small tree .... SANTALUM.
2. Leaves alternate. Stamens without interposed processes. Flowers polygamous. A shrub .... OSYRIS.

Mostly astringent. Wood aromatic; leaves aperient and emetic.

OFFICIAL:—*Eucarya spicata* Sprague and Summerhayes=*Santalum spicatum* (Great Britain).

Santalum spp. (Spain); *S. album* Linn. (Australia, Belgium, Denmark, France, Germany, Great Britain, Holland, Japan, Norway, Russia, Spain, Sweden, Switzerland, United States).

SANTALUM Linn.

Trees or shrubs. Leaves glabrous, subcoriaceous, opposite (rarely alternate). Flowers hermaphrodite, axillary or in terminal 3-chotomous paniculate cymes; bracts minute. Perianth-tube campanulate or ovoid, adnate to the base of the ovary; limb 4- (rarely 5-) lobed, the lobes valvate and with a tuft of hairs on the face. Stamens 4 or 5, adnate to the base of the perianth-lobes; filaments slender, short; anthers ovate, the cells distinct, parallel. Disk of fleshy spathulate scales, projecting between the stamens. Ovary at first free, ultimately ½-inferior; ovules 2-3, inserted below the summit of a long acuminate free central column; style elongate; stigma 2-3-lobed. Fruit a subglobose drupe, annulate on the top by the deciduous perianth; endocarp rugose. Seed subglobose; albumen copious; embryo linear, terete, straight or nearly so, in the centre of the albumen; radicle exceeding the cotyledons.—Species 10.—Indo-Malaya.

S. album Linn. is used medicinally in China, Cambodia, and Madagascar, *S. freycinetianum* Gaud. in the Sandwich Islands.

OFFICIAL:—The wood of *S. album* Linn. (France, Japan).

The oil from the wood of *Santalum spp.* (Spain), *S. album* Linn. (Austria, Belgium, Denmark, France, Germany, Great Britain, Holland, Japan, Norway, Russia, Spain, Sweden, Switzerland, United States).

1. **Santalum album** Linn. Sp. Pl. (1753) 349.—PLATE 844.

A small evergreen glabrous tree with slender drooping branches; the sapwood white and odourless, the heartwood yellowish brown, strongly scented. Leaves 3.8-6.3 by 1.6-3.2 cm., elliptic-lanceolate, subacute, glabrous, entire, thin, base acute; petioles 1-1.3 cm. long, slender. Flowers brownish purple, inodourous, in terminal and axillary paniculate cymes shorter than the leaves. Perianth campanulate; limb of 4 valvate triangular segments. Stamens 4, exserted, alternating with 4 rounded obtuse scales. Drupe globose, 1.3 cm. diam., purple-black; endocarp hard, ribbed.

Distribution: W. Peninsula. Cultivated elsewhere.

The wood is bitter; cooling, dry; exhilarating, alexiteric, antipyretic, aphrodisiac, useful in diseases of the heart, "kapha", thirst, biliousness, burning sensation, cold in the head, strangury, bronchitis, vaginal discharges, smallpox (Ayurveda).

The wood has a bitter bad taste; tonic to the heart, and the brain; astringent to the bowels, laxative; useful in inflammations, gleet, gonorrhœa, headache (Yunani).

The wood, ground up with water into a paste, is commonly applied to local inflammations, to the temples in fevers, and to skin diseases to allay heat and pruritus. It also acts as a diaphoretic.

In cases of morbid thirst, the powder of the wood is recommended to be taken in cocoanut water. A bolus of ground sandal checks hæmoptysis in its mild form, when taken twice a day for two or three days.

The seeds contain an oil which is used in skin diseases.

In Cambodia, the wood is considered diuretic and antipyretic.

In Madagascar, the wood is mixed with salt, and applied to wounds.

Sandalwood is not an antidote to either snake-venom (Mhaskar and Caius) or scorpion-venom (Caius and Mhaskar).

Arabic: Sandalabiyaz—; *Bengal:* Chandan, Pitchandan, Srikhanda, Sufaidchundun—; *Bombay:* Chandan, Safedchandan, Sandal—; *Burma:* Karamai, Nasaphiyu, Sandaku, Santaku—; *Cambodia:* Chan sa—; *Canarese:* Agarugandha, Bavanna, Bhadrasri, Chandala, Chandana, Ganda, Gandada, Gandha, Gundada, Patira, Srigandha, Tailaparni—; *Chinese:* T'an Hsiang, T'an Muh—; *Coorg:* Chandana—; *Dutch:* Sandelboom, Sandelhout—; *English:* Sandal Tree, Sandal Wood, White Sandal Wood, Yellow Sandal Wood—; *French:* Santal blanc, Santal citrin, Santal citron, Santal de Freycinet, Santal jaune—; *German:* Sandelholzbaum, Weisses Sandelholz—; *Greek:* Santalon—; *Gujerati:* Suket, Sukhud—; *Hindi:* Chandal, Chandan, Chandoi, Safedchandan, Sandal—; *Lambadi:* Chandnero—; *Malayalam:* Chandanam, Gandharajam, Gandhasaram, Malayajam, Maleyam, Patiram, Tailaparnnikam, Venjandanam—; *Marathi:* Chandan, Gandhachakoda—; *Menabe:* Mazozano—; *Persian:* Sandalsuped—; *Portuguese:* Sandalo—; *Punjab:* Chandan—; *Roumanian:* Lemn mirositor,

Santal—; *Russian:* Sandal—; *Sanskrit:* Anindita, Bhadrasara, Bhadrashraya, Bhadrashri, Bhadrashriya, Bhogivallabha, Chandradyuti, Chandana, Chandrakanta, Dahasini, Ekangi, Gandhadhya, Gandhasara, Goshirsha, Gramya, Harichandana, Krishnachandana, Maharha, Malayaja, Malayodbhava, Mangalya, Panjasugandha, Patira, Pavana, Pitasara, Rajayoghya, Rauhina, Sarpavasa, Sarpeshta, Sevya, Shrigandha, Shrikhanda, Situhima, Tailaparna, Tilaparna, Valgaka, Varnaka—; *Sind:* Sukhad—; *Sinhalese:* Rathihiri—; *Spanish:* Sandalo, blanco, Sandalo citrino—; *Tamil:* Anukkam, Asam, Igam, Ingam, Kandam, Koravaram, Kulavuri, Malaivedbu, Malaiyaram, Malaiyasam, Padiram, Pidasaralam, Pidasaram, Saleyam, Sandanam, Sandani, Selegam, Selodam, Sisiram, Ulosidam—; *Telugu:* Bhadrasri, Chandanamu, Gandhamu, Gandhataruvu, Gosirshamu, Harichandamu, Krishnachandanamu, Kalaka, Malayajamu, Malayamu, Patiramu, Pitachandanamu, Raktakrishnachandanamu, Srigandamu, Srigandhamu, Tellachandanamu—; *Tulu:* Chandana, Ganda—; *Urdu:* Sandalsafed—; *Uriya:* Chondono, Gondhosaro, Moloyogo, Ogory—.

OSYRIS Linn.

Glabrous shrubs; young branches angular. Leaves alternate, entire; stipules 0. Flowers small, axillary, polygamous (male and 2-sexual), the male flowers in clusters, the bisexual often solitary. Perianth-tube solid in the male flowers, in the 2-sexual flowers adnate to the ovary; lobes 3-4, triangular, valvate, with a tuft of hairs on the face. Stamens 3 or 4, inserted at the base of the perianth-lobes; anther-cells distinct. Disk angular. Ovary inferior, sunk in the perianth-tube; ovules 2-4, pendulous from a short stout central placenta; style short; stigma 3-4-lobed. Fruit a globose or ovoid drupe. Seed globose, solitary; embryo in the centre of copious fleshy albumen.—Species 7.—Old World.

The root and fruit are astringent.

O. abyssinica Hochst. is used medicinally in Abyssinia and Southern Rhodesia; *O. lanceolata* Hochst. in Algeria and Morocco.

1. **Osyris arborea** Wall. Cat. (1828) 4035.—*O. Wightiana* Wall.; Wight Ic. t. 1853.—PLATE 845.

An evergreen twiggy shrub 1.5-3 m. high, shoots sharply 3-angled. Leaves alternate, 2.5-5 by 1.3-2.5 cm., very variable in shape, elliptic-lanceolate or obovate-oblong, obtuse or acute, mucronate, base cuneate, dull glaucous green, sessile. Flowers minute, greenish, polygamous; male in axillary 5-10-flowered umbels, peduncles 7.5-12.5 mm. long, flattened, often arranged in short racemose panicles; bisexual solitary on slender axillary pedicels 5 mm. long, lengthening in fruit. Perianth-tube solid in male, adnate to the ovary in bisexual flowers, limb 3-lobed, lobes triangular, valvate. Stamens inserted at the base of the perianth-lobes. Disk fleshy, 3-lobed, the lobes alternating with the stamens. Ovary sunk in the perianth-tube, 1-celled; ovules 2-4; style short; stigma 3-lobed. Drupe 7.5 mm. diam., subglobose, nearly dry, crowned by the disk, red when ripe.

Distribution: Subtropical Himalaya, Burma, Central Provinces, W. Peninsula, Ceylon.

The infusion of the leaves is a powerful emetic.

Belgaum: Popli—; *Canarese:* Baingani, Kuriganda, Natadike, Tamparale—; *Kumaon:* Bakardharra, Bakarja—; *Marathi:* Lotal, Popoli—; *Nepal:* Jhuri—; *North-Western Himalayas:* Dalima, Dalmi—.

EUPHORBIACEAE.

Trees, shrubs or herbs often with milky juice. Leaves alternate or opposite, rarely divided or compound; stipules usually small, caducous or persistent, rarely connate in a bud-protecting sheath; glands sometimes at the apex of the petiole or at the base of the leaf-blade. Flowers usually small or minute, always 1-sexual; inflorescence various, usually compound, sometimes (Euphorbia) of single naked 1-staminate florets in a perianth-like involucre surrounding a solitary pistil, more commonly the main inflorescence centripetal, axillary or racemose, the subdivisions cymose, sometimes wholly cymose in terminal dichotomous panicles, or reduced to simple clusters or solitary florets. Perianth often small, sometimes obsolete, often dissimilar in the 2 sexes, usually simple, calycine with valvate or imbricate segments, sometimes calycine and 2-seriate imbricate, with segments all similar or occasionally dissimilar, rarely double, the inner then of 4-5 small scale-like, or very rarely conspicuous petals. Male flowers : Torus sometimes forming an intra-staminal disk or with disk -glands or -lobes alternate with the stamens of the outer series. Stamens various, sometimes solitary or fewer than, sometimes as many as the sepals or petals, sometimes indefinite (rarely very numerous); filaments free or connate; anthers 2-celled, often didymous with longitudinal, transverse or porous dehiscence. Rudimentary ovary present or 0. Female flowers : Sepals usually larger and less connate than in the male. Petals sometimes smaller and less often present than in the male. Disk hypogynous or of discrete glands or 0. Ovary superior, sessile or stipitate, usually of 3 (rarely more or 2) carpels more or less united; ovules 1-2 in each carpel, pendulous from the inner angle of the cell, the funicle often thickened; styles as many as the carpels, free or united or entire or divided; stigmatic surface usually on the inner face of the styles or style-arms. Fruit usually a capsule of three 2-valved 1-2-sedeed cocci separating from a persistent axis, or a drupe with 1-3 cells or of one or more combined nuts. Seeds laterally attached at or above the middle of the cells, with or without an aril or caruncle at the hilum; albumen fleshy; embryo straight, enclosed in the albumen; cotyledons flat,

leafy, and radicle superior; rarely albumen 0 and cotyledons fleshy. —Genera 220. Species 4,000.—Cosmopolitan except arctic.

A. Cells of ovary 2-ovuled
- I. Flowers monoecious; males numerous .... EUPHORBIA.
- II. Flowers monoecious; male flowers: Sepals 4, imbricate; petals absent
  - a. Leaves alternate .... HURA.
  - b. Leaves opposite .... BUXUS.
- III. Sepals 1-2-seriate. Petals minute or absent. Stamens 1-2-seriate. Ovary 2-many-celled; cells 2-ovuled
  - a. Leaves alternate, undivided, quite entire. Petals present. Stamens 3-6
    1. Ovary 2-celled. Fruit a drupe .... BRIDELIA.
    2. Ovary 3-celled. Fruit capsular .... CLEISTANTHUS.
    3. Herbs or slender shrubs. Flowers small. Male disk of 10 glands .... ANDRACHNE.
  - b. Leaves alternate, rarely subopposite, undivided, quite entire. Sepals imbricate. Petals absent. Stamens 3 or more
    1. Herbs, shrubs or trees. Sepals 4-6. Disk present in both sexes. Styles terminal, free or united below .... PHYLLANTHUS.
    2. Shrubs or trees. Calyx 4-6 -lobed, -toothed, or -partite. Disk absent in either sex. Styles confluent in a long or short head, cone or column .... GLOCHIDION.
    3. Shrubs. Flowers dioecious. Sepals 5. Stamens 3-5. Styles elongate. Fruit fleshy or dry with 6 cocci .... FLUEGGEA.
    4. Trees. Sepals and stamens 4. Fruit fleshy with a bony 3-4-celled putamen .... CICCA.
    5. Shrubs or trees. Male calyx turbinate or hemispheric; lobes minute, inflected. Anthers 3. Fruit dry or fleshy with 3-6 indehiscent cocci .... BREYNIA.
    6. Slender shrubs. Calyx of male rotate or disciform, mouth minute 6-lobed. Stamens 3. Fruit dry or fleshy with 6 indehiscent cocci .... SAUROPUS.
  - c. Leaves alternate, undivided, entire or serrulate. Sepals imbricate. Petals absent. Stamens few or many. Styles or stigmas 2-3, dilated. Fruit a drupe
    - Stamens 2-3. Ovary 2-3-celled. Drupe 1-celled ...... PUTRANJIVA.
  - d. Leaves alternate, trifoliolate. Sepals imbricate. Petals absent. Fruit a berry
    - Sepals 5, imbricate. Stamens 5 .... BISCHOFIA.
  - e. Trees and shrubs. Leaves alternate quite entire. Styles or Stigmas usually very minute. Fruit various
    1. Male flowers most minute in dense-flowered catkin-like spikes. Stamens 2-5. Ovary 2-celled. Stigmas 2-4-fid .... APOROSA.

2. Male flowers minute, spicate or racemose. Stamens 2-5. Ovary 1-2-celled. Drupe small, rugose, usually compressed .... ANTIDESMA.

B. Cells of ovary 1-ovuled

IV. Perianth single, or of the male or of both sexes double. Stamens 1-2-seriate. Ovary 2-3-celled. Cells 1-ovuled. Inflorescence terminal or axillary

a. Leaves digitately nerved or lobed. Stamens many. Fruit capsular .... JATROPHA.

b. Leaves palmilobed. Juice usually milky. Stamens 10 in 2 whorls .... MANIHOT.

c. Leaves digitately nerved. Stamens 8-20. Fruit a drupe .... ALEURITES.

d. Flowers in terminal androgynous spikes or racemes. Petals usually villous. Capsule of 3 cocci .... CROTON.

e. Stellately tomentose herbs or shrubs. Anthercells connate. Styles bifid. Sepals valvate. Petals free. Fruit capsular .... CHROZOPHORA.

f. Styles very long fimbriate or lacerate. Female flowers in large bracts .... ACALYPHA.

g. Leaves alternate. Stamens very numerous. Anthers 2-celled, cells parallel. Fruit fleshy or capsular .... TREWIA.

h. Leaves opposite or alternate. Stamens very many central in the flowers. Anthers-cells usually globose .... MALLOTUS.

i. Styles entire. Anther-cells subglobose. Fruit capsular .. MACARANGA.

j. Male and female flowers in axillary spikes. Staminal bundles ∞. Capsule unarmed .... HOMONOIA.

k. Flowers in terminal panicles. Staminal bundles ∞ .... RICINUS.

l. Male flowers in panicled cymes. Sepals 4-5. Capsule of 3, 2-valved cocci .... BALIOSPERMUM.

m. Racemes androgynous. Male calyx 3-5-partite. Stamens 1-3. Styles spreading above .... TRAGIA.

V. Perianth single. Calyx of male minute and open in bud or obsolete. Trees or shrubs (except SEBASTIANIA).

a. Racemes terminal. Male calyx terete, 2-3-lobed .... SAPIUM.

b. Racemes lateral or terminal. Calyx terete, 3-partite. Stamens 3 .... EXCOECARIA.

c. Annual. Racemes axillary and terminal .... SEBASTIANIA.

d. Flowers monoecious. Male calyx 2-3-lobed. A tree .... HIPPOMANE.

Stimulant, emetic, diuretic and cathartic.

The whole Order must be regarded with suspicion for, in some form or other, an acrid biting poison permeates the entire group. In many instances, however, the acridity is destroyed or modified by heat.

The literature dealing with the toxic principles isolated from Euphorbiaceae is one mass of confusion. The following may be

mentioned: alcohols—crotonol—; ketones—ricinone—; acids—crotonoleic—; alkaloids—buxine, buxidine, choline, 4-hydroxyhygric acid, mercurialine, ricinine—; glucosides—paristyphnin, ricin—; neutral principles—euphorbin—.

OFFICIAL :—*Buxus sempervirens* Linn. var. *arborescens* Lamk., var. *suffruticosa* Lamk. (Portugal).

Croton Eluteria Bennett (Austria, Denmark, Holland, Japan, Norway),—non Swartz (Portugal),—Bennet (Italy, Sweden),—(L.) Bennet (Switzerland),—J. J. Benn. (Great Britain),—L. Bennet (Russia); *C. Tiglium* Linn. (Austria, Belgium, Denmark, France, Germany, Great Britain, Japan, Norway, Russia, Spain, Switzerland, United States)=*Tiglium officinale* Klotzsch (Portugal).

Euphorbia canariensis Linn. (Portugal, Spain); *E. resinifera* Berg. (Austria, Belgium, Denmark, France, Germany, Hungary, Italy, Norway, Russia, Spain, Sweden, Switzerland, Turkey),—O. Berg (Portugal).

Hevea spp. (Spain, Switzerland); *H. brasiliensis* Muell. (Holland, Spain),—Muell.-Arg. (Austria, France, Hungary),—(Humboldt, Bonpland, Kunth) Mueller Argoviensis (Germany, Switzerland); *H. guianensis* Aubl. (Austria, Spain); *H. lutea* Muell. (Spain).

Hura crepitans var. *genuina* De Cand.=*H. brasiliensis* Willd. (Portugal).

Jatropha Manihot Linn.=*Manihot utilissima* Pohl (Portugal).

Mallotus philippinensis Mueller=*Rottleria tinctoria* Roxburgh (Italy),—Muell.-Arg. (Austria, Hungary, Japan, Switzerland,—(Lamarck) *Muller Argoviensis* (Germany).

Manihot utilissima Pohl (Holland).

Mercurialis ambigua Linn. fil. (Portugal), *M. annua* Linn. (France, Portugal).

Ricinus communis Linn. (Austria, Belgium, Denmark, France, Germany, Great Britain, Holland, Hungary, Italy, Japan, Norway, Portugal, Russia, Spain, Sweden, Switzerland, Turkey, United States).

Rottlera tinctoria Roxb.=*Mallotus philippinensis* Muell. (Portugal).

Euphorbia Linn.

Herbs, shrubs, or small trees of various habit, with milky juice; stems slender and leafy or thick and fleshy and sometimes leafless or nearly so. Leaves opposite or less commonly alternate. Flowers monoecious, combined in an inflorescence of many male florets surrounding a solitary female, arranged in a common 4-5-lobed perianth-like involucre with thick glands at the mouth, each gland often bearing a petaloid spreading white or coloured limb. Male flowers a stalked stamens without floral envelope. Female flowers : Ovary 3-celled on an ultimately exserted stalk in the centre of the involucre; ovule solitary in each cell; styles 3, free or connate. Fruit a capsule of three 2-valved cocci, separating elastically from a persistent axis and dehiscing ventrally or both ventrally and dorsally. Seeds albuminous; cotyledons broad, flat. The flower-heads in the genus have all the appearance of a single 2-sexual flower, especially when the involucre bears petal-like appendages. Species 750.—Chiefly subtropical and warm temperate.

A. Herbs, rarely shrubby below; prostrate or ascending. Leaves all opposite; glands 4-5, usually furnished with a membranous petaloid limn
   1. Glabrous or sparsely pubescent .... 1. *E. hypericifolia.*
   2. Hispid with copious crisped hairs .... 2. *E. hirta.*
 a. Stems hispidly hairy. Capsules pubescent or hirsute
   1. Leaves crenulate. Capsules pubescent. Seeds furrowed .... 3. *E. thymifolia.*
   2. Leaves entire. Capsules hirsute. Seeds pitted ...... 14. *E. granulata.*
 b. Stems glabrous. Capsules glabrous
   1. Leaves nearly as broad as long. Seeds smooth ...... 4. *E. microphylla.*
   2. Leaves from a very unequal base, elliptic-rhomboid, very obtuse .... 15. *E. sanguinea.*
 c. Stems glabrous or short-hairy .... 16. *E. turcomanica.*

B. Shrubs or trees with fleshy terete ribbed angled or flattened stems and branches. Leaves absent or alternate or the upper opposite
 a. An erect unarmed shrub or tree. Branches spreading cylindric, scattered whorled or clustered .... 5. *E. tirucalli.*
 b. A tree, 3-9 m. high .... 7. *E. nivulia.*
 c. A large, branched shrub or small tree, up to 4.5 m. high .... 6. *E. nerifolia.*
 d. A large shrub or small tree up to 9 m. high. Trunk cylindric or fluted .... 8. *E. antiquorum.*

e. An erect fleshy shrub; branches with 5-7 broad flat faces	9.	*E. royleana.*
C. Herbs, rarely shrubby below, usually erect. Leaves alternate, upper opposite		
a. Stem 30 cm. high, simple, sparingly leafy. Leaves 2-3.8 cm., sessile, elliptic or ovate, obtuse or subacute ..	10.	*E. thomsoniana.*
b. A perennial herb, glabrous or sparsely hairy. Leaves 2.5-10 cm., sessile, linear-oblong, obtuse or acute	13.	*E. longifolia.*
c. An annual herb. Capsule smooth; seeds pitted	11.	*E. helioscopia.*
d. An annual herb. Capsule smooth; seeds oblong, leprous	12.	*E. dracunculoides.*

The bark is cathartic; the leaves diuretic, and sudorific; the milky juice is a drastic purgative, rubefacient, and anthelmintic.

The following species are used medicinally in Europe—*E. chamaesyce* Linn., *E. characias* Linn., *E. cyparissias* Linn., *E. esula* Linn., *E. helioscopia* Linn., *E. lathyris* Linn., *E. myrsinites* Linn., *E. peplis* Linn., *E. peplus* Linn., *E. resinifera* Berg., *E. serrata* Linn—; in Arabia—*E. antiquorum* Linn., *E. officinarum* Linn.—; in China—*E. adenochlora* Morr. and Dcne., *E. helioscopia* Linn., *E. humifusa* Willd., *E. lathyris* Linn., *E. pekinensis* Rupr., *E. sieboldiana* Morr. & Dcne.—; in Indo China—*E. antiguorum* Linn., *E. chamaesyce* Linn.—; in Malaya—*E. lathyris* Linn., *E. pekinensis* Rupr., *E. sieboldiana* Morr. & Dcne—; in the Philippine Islands—*E. neriifolia* Linn., *E. pilulifera* Linn., *E. tirucalli* Linn.—; in Australia—*E. drummondii* Boiss.—; in Fiji—*E. pilulifera* Linn.—; in North America—*E. corollata* Linn., *E. ipecacuanha* Linn., *E. maculata* Linn., *E. preslii* Guss.—; in Mexico—*E. prostrata* Ait., *E. pulcherrima* Willd.—; in Peru—*E. pulcherrima* Willd.—; in Chili—*E. portulacoides* Linn.—; in Brazil—*E. brasiliensis* Lam., *E. coecorum* Mart., *E. cotinifolia* Linn., *E. heterodoxa* Muell.-Arg., *E. hypericifolia* Linn., *E. papillosa* St. Hil., *E. phosphorea* Mart.—; in Guiana—*E. cotinoides* Miq., *E. hypericifolia* Linn., *E. pilulifera* Linn., *E. punicea* Sw.—; in the West Indies—*E. pilulifera* Linn., *E. pulcherrima* Willd.—; in the Canary Islands and in Guinea—*E. canariensis* Linn.—; in West Africa—*E. aegyptiaca* Boiss., *E. pilulifera* Linn., *E. sepium* N. E. Br.—; in the Gold Coast—*E. lateriflora* Schum. & Thonn., *E. pilulifera* Linn.—; in Abyssinia—*E. cerebrina* Hochst.—; in Ethiopia—*E. officinarum* Linn.—; in Madagascar—*E. anagalloides* Bak., *E. bojeri* Hook., *E. emirnensis* Bak., *E. erythroxyloides* Bak., *E. pilulifera* Linn., *E. splendens* Boj.,

E. trichophylla Bak.—; in La Reunion *E. dissimilis* Cordem., *E. goliana* Lam., *E. heyneana* Boiss., *E. hypericifolia* Linn., *E. peplus* Linn., *E. pilulifera* Linn., *E. prostrata* Ait., *E. thymifolia* Burm., *E. tirucalli* Linn.—; in Southern Africa—*E. abyssinica* J. F. Gmel., *E. basutica* Marl., *E. bupleurifolia* Jacq., *E. clavaroides* Boiss., *E. helioscopia* Linn., *E. inaequilatera* Sond., *E. ingens* E. Mey., *E. mauritanica* Linn., *E. pugniformis* Boiss., *E. restituta* N. E. Br. *E. sanguinea* Hochst. & Steud., *E. striata* Thunb., *E. truncata* N. E. Br., *E. virosa* Willd.—.

E. candelabrum Tremant., *E. mauritanica* Linn., *E. striata* Thunb., and *E. virosa* Willd. are used as arrow poisons by the Bushmen of Southern Africa.

Official :—The latex of *E. canariensis* Linn. in Portugal, Spain; *E. resinifera* Berg. in Austria, Belgium, Denmark, France, Germany, Hungary, Italy, Norway, Russia, Spain, Sweden, Switzerland, Turkey,—O. Berg (Portugal).

1. **Euphorbia hypericifolia** Linn. Sp. Pl. (1753) 454.—Plate 846B.

A herb of various habit with stems 15-60 cm. long (or high), with oblong or somewhat obovate obtuse or rounded serrulate leaves under 4.3 cm. long, with oblique rounded or cordate base. Involucres campanulate minute, 1.75 mm. long, in numerous small cymes, axillary or terminating short axillary branchlets, about 1.3 cm. diam., with erect, narrow lanceolate bracts at all the nodes. Lobes of the involucre narrowly lanceolate, acuminate, longer than the shortly stipitate glands, which are 4-5, disciform, usually with a minute white or pink petaloid limb. Ovary and capsule glabrous, appressed hairy or hispid. Seeds smooth or with shallow transverse pits.

Distribution: Common throughout the hotter parts of India and Ceylon.—Tropics generally except Australia and the Pacific Islands.

An infusion of the dried leaves is a remedy in dysentery, diarrhœa, menorrhagia, and leucorrhœa, and it affects the system as an astringent and feeble narcotic.

It is given with milk to children in colic (Stewart).

In Guiana, cataplasms of the plant are applied in cephalalgia. In La Reunion, the plant is considered drastic, but rarely used.

Bombay: Nayeti—; *Brazil:* Erva de Santa Luzia—; *French Guiana:* Marie claire—; *Gujerati:* Dudheli—; *Hindi:* Dudhi, Dudhikalave, Hakshardana—; *La Reunion:* Jean Belan—; *Marathi:* Dhaktidudhi, Dudhmogra, Dudhi—; *Porebunder:* Dhakradunmaro, Dudheli—; *Punjab:* Hazardana—; *Sanskrit:* Dugdhika—; *Sinhalese:* Eladadakiriya—.

2. **Euphorbia hirta** Linn. Sp. Pl. (1753) 454.—*E. pilulifera* Linn. Sp. Pl. (1753) 454.—PLATE 846A (under *E. pilulifera* Linn.).

Annual, 15-50 cm. high, erect or ascending, hispid with long often yellowish crisped hairs; stems usually terete; branches often 4-angled. Leaves opposite, 1.3-3.8 by 0.6-1.6 cm., obliquely oblong-lanceolate or obovate-lanceolate, acute or subacute, serrulate or dentate, dark green above, pale beneath, base usually unequal-sided, acute or rounded; main nerves few, distinct; petioles distinct, 1.5-3 mm. long; stipules pectinate, soon falling. Involucres numerous, less than 1.25 mm. long, on a stalk of about the same length, crowded in small axillary shortly pedunculate globose cymes; gland minute, globose, either without a limb or with a very small orbicular white entire one. Capsules 1.25 mm. diam., appressedly hairy. Seeds 0.8 mm. long, ovoid-trigonous, slightly transversely rugose, light reddish brown.

Distribution: Throughout the hotter parts of India and Ceylon.—Most tropical and subtropical countries.

The juice of the plant is given in dysentery and colic, and the milk applied to destroy warts. A decoction is used in asthma and chronic bronchial affections.

The plant is chiefly used in the affections of childhood, in worms, bowel complaints, and cough. It is sometimes prescribed in gonorrhœa.

The root is given by the Santals to allay vomiting, and the plant to nursing mothers when the supply of milk is deficient or fails.

The plant is widely used in West Africa as a medicine. On the Gold Coast, it is ground and mixed with water, and then used

as an enema. The white juice is used by women to increase the flow of milk. The leaves are used in curing sores; their juice is sometimes squeezed into the eyes to cure eye trouble.

The herb is very much used in La Reunion, as an astringent in chronic diarrhœas and dysenteries. It is also applied topically to ulcers, oedemas, and phlegmons. The juice is given for aphthae. It is considered tonic, narcotic, and antiasthmatic.

A popular astringent and haemostatic in the Philippine Islands.

The plant is much used in Guiana, as a febrifuge. As a poultice it is applied to abscesses and inflamed glands.

There is no doubt that an extract of this plant has sedative effect on the mucous membrane of the respiratory and genito-urinary tract. It has been found by me very beneficial in cases of asthma. I have been using a tincture of it in my private practice in diseases of the genito-urinary tract and in chronic bronchitis and asthma. The result has been very satisfactory (Koman).

According to Dikshit and Kameshwar Rao experiments conducted on cats, dogs, and rabbits, with and without anaesthesia, show that the drug has got a fairly marked action on the respiratory system, depressing the respiration and producing a well marked dilatation of the bronchioles. The drug produces a local irritation of the stomach when given by mouth in larger doses and produces nausea and vomiting. If injected intravenously in animals, however, it has got a depressant action on the movements of the intestines. There is an immediate cessation of the automatic movements of the intestines and a relaxation of the tone of the muscle. The cardio-vascular system is depressed, and an intravenous injection leads to a fall of blood pressure chiefly due to the depression of the heart. Perfusion experiments show a depression of the heart. Other systems of the body like the genito-urinary system are not markedly affected (18th Ind. Sc. Congress; Nagpur, 1931).

Awuna: Ahinkodze, Notsigbeng—; *Bengal:* Burakeru, Burokeruee—; *Betsileo:* Aidinono—; *Bombay:* Nayeti—; *Canarese:* Achchegida—; *Central Provinces:* Gordon—; *Ceylon:* Palavi—; *English:* Australian Asthma Herb, Pill-bearing spurge, Snake Weed—; *Ewe:* Notsigbee—; *French:* Euphorbe ă globules, Herbe

ă Jean Renaud, Herbe Jean Robert, Herbe ă serpents, Madelone plat, Mal famée, Malnommée, Pilulier, Poil de chat—; *French Guiana:* Grande malnommée, Petite malnommée rouge, Malnommée—; *Gujerati:* Dudeli, Dudhi—; *Hausa:* Nononkurchiya—; *Hindi:* Dudhi—; *Konkani:* Dudurly—; *Kwang Tung:* Yu Tchou Ts'ao—; *La Reunion:* Jean Robert—; *Malay:* Ambin jantan, Gelang susu, Kurumak susu—; *Malayalam:* Nelapalai—; *Marathi:* Dudnali, Dudhi, Govardhan, Mothidudhi—; *Mundari:* Kodasing—; *Nzima:* Akubaa—; *Pampangan:* Bolobotones, Magatas, Malismalis, Sisiohan, Sisiwhan—; *Philippines:* Botobotones, Golandrina—; *Sanskrit:* Pusitoa—; *Sinhalese:* Budadakiriya, Dadakiriya, Kiritala—; *Tagalog:* Batobatonis, Gatasgatas, Sayican—; *Tamil:* Amumpatchaiyarissi, Patchaiyarissi—; *Telugu:* Bidarie, Nanabala, Nanabiyan, Reddinanabrolu—; *Visayan:* Bovi, Buyayava, Gatasgatas, Tavava—.

3. **Euphorbia thymifolia** Linn. Sp. Pl. (1753) 454.—PLATE 847.

A small annual herb, more or less hispidly pubescent; stems prostrate, divaricately branched, slender, cylindric, more or less hairy. Leaves opposite, very small, numerous, 3-6 by 2.5-4 mm., obliquely oblong or elliptic-oblong, rounded at the apex, crenulate, glabrous above, glaucous and usually slightly pubescent beneath, base rounded, very unequal-sided; petioles very short; stipules fimbriate. Involucres axillary, solitary or 2-3 in an axil, campanulate, 0.8 mm. long; stalk very short; gland minute or 0; limb 0. Capsules 1.5 mm. long, obtusely keeled, pubescent; styles short, 2-fid. Seeds 1.25 mm. long, quadrangular, bluntly pointed, with 5 or 6 transverse furrows.

Distribution: Throughout India in the plains and lower hills, Ceylon.—All hot countries except Australia.

The leaves and seeds are given in worm cases and in certain bowel affections of children in the Tamil country. In Northern India, they are considered stimulant and laxative.

In the Konkan, the juice is used to cure ringworm. The Santals use the root as a remedy for amenorrhœa.

Among the Mundas of Chota Nagpur, it is used to stop diarrhœa, half a handful of the whole plant being pounded and drunk in a mixture with water and sugar-candy.

The fresh plant is considered vulnerary by the Arabs.

In La Reunion, the herb is used as an astringent in diarrhœa and dysentery.

The expressed juice or the powdered plant is administered internally with wine as a remedy for snake-bite, and it is applied externally to the part bitten; but whether given internally or applied externally the plant is equally useless in the treatment of snake-bite (Mhaskar and Caius).

Bengal: Dudiya, Shweetkeruee, Swetkerua—; *Bombay:* Nayata, Nayeti—; *Ceylon:* Chittirapalavi—; *Gujerati:* Nahanidudheli—; *Hindi:* Chhotidudhi, Chothadudhi—; *La Reunion:* Rougette—; *Malay:* Segan padang—; *Marathi:* Ghakdidudhi, Lahandudhi, Mothidudhi—; *Mundari:* Kodasingjaite—; *Nasirabad:* Khiri—; *Persian:* Gazardanah—; *Porebunder:* Jhinkidudheli, Jhinkodhakardhumaro—; *Punjab:* Baradodak, Hazardana—; *Sanskrit:* Laghudugdhika, Raktavindachada—; *Santal:* Nanhapusitoa—; *Sinhalese:* Bindadakuriya—; *Tamil:* Chinamampatchaiyausi, Sittrapaladi—; *Telugu:* Bidurunanabiyam, Reddivarimanubala—.

4. **Euphorbia microphylla** Heyne in Roth Nov. Pl. Sp. (1821) 229.—PLATE 848B.

A nearly glabrous annual; stems numerous, spreading from the root, 10-25 cm. long, whitish, slender, leafy, glabrous, brittle, dichotomously branched. Leaves opposite, 4-6 mm. long, often nearly as broad as long, coriaceous, obliquely oblong, rounded-oblong, or subquadrate, rounded, subtruncate or retuse at the apex, usually entire, often with pink margins; stipules 2-partite or laciniately toothed. Involucres numerous, subsolitary, axillary, 1 mm. long, broadly campanulate, glabrous; stalk 0.6 mm. -1.2 mm. long; lobes triangular, apiculate; gland very shortly stipitate with a small limb. Capsules 1.5 mm. diam., glabrous, keeled; styles short, deeply 2-fid. Seeds scarcely 1.2 mm. long, obtusely quadrangular, very bluntly pointed, yellowish brown, smooth, mucous when wetted.

Distribution: Bengal, Bihar, W. Peninsula.—Java.

In Chota Nagpur, a preparation of this plant, along with that of *Cryptolepis Buchanani* is given to nursing mothers when the supply of milk fails or is deficient.

Bengal: Chotokeruee—; *Gujerati:* Dudhi—; *Marathi:* Dudhi—; *Porebunder:* Ekphulidudheli—; *Santali:* Dudhiaphul—.

5. **Euphorbia tirucalli** Linn. Sp. Pl. (1753) 452.—PLATE 849B.

A small tree easily recognized from the erect branches and smooth, terete, polished, whorled or fascicled branchlets, not much thicker than a quill, which bear in the rainy season small linear-oblong leaves, 6-13 mm. long. Involucres clustered in the forks of the branchlets, shortly pedicelled, mostly female, campanulate, glands 5-3, transversely oval peltate, lobes short, hairy, bracteoles numerous, lacerate. Female woolly, styles short, recurved, 2-lobed. Capsules 5 mm., cocci compressed, velvety. Seeds ovoid, smooth.

Distribution: Tropical E. Africa.—Naturalized in India.

The plant is hot; useful in biliousness, leprosy, leucorrhœa.—The milk is alexiteric, carminative; useful in abdominal troubles, tumours, "vata" (Ayurveda).

The juice is purgative, carminative; useful in gonorrhœa, whooping cough, asthma, dropsy, leprosy, enlargement of the spleen, dyspepsia, jaundice, colic, tumours, stone in the bladder (Yunani).

The fresh milky juice is applied to warts, and used as a rubefacient embrocation in rheumatism. It is good alterative in syphilis, and a good application in neuralgia. In the Konkan, it is given as a purge.

The root is used in La Reunion as a vesicant, more rarely as an emeto-cathartic.

Arabic: Azfurzukkum, Zaqqumehindi—; *Bengal:* Lankasij, Latadaona—; *Bombay:* Niwal, Sehund, Seyr, Shera, Tej Thor, Thora—; *Burma:* Shashoungleknyo, Shasounglekhnyo, Tazaung-lekhnyo—; *Canarese:* Bottugalli, Kalli, Kodukalli, Kolugalli, Kolukalli, Nandugalli, Pachanegalli, Yellegulla—; *Deccan:* Barkisend, Karikisend, Send—; *English:* Milk Bush, Milk Hedge, Indian Tree

Spurge—; *Goa:* Nival—; *Gujerati:* Dandaliothora, Pardeshithora, Thordandalio—; *Hindi:* Konpahlsehnd, Sehud, Sehund, Sendh, Shirthohar, Sindh, Thohra—; *Lambadi:* Taria—; *La Reunion:* Liane sans feuilles, Tirucalli—; *Malayalam:* Guda, Katerumakkalli, Kolkalli, Tirukalli—; *Marathi:* Nevli, Nirval, Nivla, Seyr, Seyrteg, Shera, Tej, Thuvar, Vajraduhu—; *Persian:* Shirtothar, Zaquniyæ-hindi—; *Porebunder:* Kharsanithora, Thora—; *Sanskrit:* Bahukshira, Dandasruha, Ganderi, Snuka, Trikuntaka, Vajradruma—; *Santal:* Siju—; *Sind:* Thora—; *Sinhalese:* Navahandi, Thovar—; *Tagalog:* Catuit—; *Tamil:* Kalli, Kiri, Kombukkalli, Pachankalli, Parchanu, Tirukkalli, Tiruvatti—; *Telugu:* Chemudu, Jemudu, Kadujemudu, Kalli, Kanjijemudu, Sannajemudu—; *Tigrinia:* Qoutscheh—; *Tulu:* Kodukalli—; *Urdu:* Zakum—; *Uriya:* Lonkasiju—; *Zulu:* uMunde, umSululu—.

6. **Euphorbia neriifolia** Linn. Sp. Pl. (1753) 451.—*E. ligularia* Roxb. Hort. Beng. (1814) 36.—Plate 849A.

A large branched shrub or small tree, 1.8-4.5 m., with the pairs of stipular spines on tubercles or swellings of the branchlets, these tubercles more or less confluent in 5 vertical or slightly spiral lines, so that the branch is more or less obtusely 5-gonous in section. Leaves obovate, very similar to those of E. nivulia. Involucres yellowish, 3-7 in a cyme, usually 3, with a very short fleshy peduncle about 3.8 mm. long. Oldest involucre, male, 2-bracteate, bearing in the bract axils a 2-sexual involucre, the opposite bracts of which may in their turn bear each a peduncle and are 3-lobed with central lobe toothed. Lobes of involucres broadly cuneate and fimbriate, much as in E. nivulia. Anthers sagittate, apiculate. Fruit as in E. nivulia. Style 3-fid, stigmas slightly dilated and minutely toothed.

Distribution: W. Peninsula, cultivated elsewhere and in Ceylon, Baluchistan.—Malay Islands.

The plant is bitter, pungent; laxative, carminative, alexipharmic; improves the appetite; useful in abdominal troubles, bronchitis, tumours, loss of consciousness, delirium, leucoderma, piles, inflammations, enlargement of the spleen, anæmia, ulcers, fevers.—The milk is pungent, laxative; good for abdominal troubles, tumours,

spines (or some unarmed). Pairs of spines inserted on flat brown or black corky areas, not on swellings of the branchlets. Leaves (usually only present in the rainy season) up to 23 by 6.3 cm., fleshy, linear-oblanceolate or spathulate, obtuse, apiculate, base narrowly cuneate, nerves only visible by transmitted light. Petiole 0. Cymes about twice forked, borne at the leaf-scars towards the ends of the branchlets, 3.8 cm. long. Involucres yellow, anthers purple with yellow pollen. Stigmatic lobes flattened and slightly expanded. Capsule sharply 3-lobed, lobes compressed.

Distribution: Bengal, S. India, Burma. Often planted.

The properties are the same as those of *E. tirucalli* (Yunani).

The juice of the leaves is used internally as a purgative and a diuretic; mixed with nim oil it is applied externally in rheumatism. The warm juice is a good cure for earache, and it is occasionally rubbed over the eyes to remove dimness of sight.

On the Western Coast, the root bark is boiled in rice water and arrack, and given in dropsy.

The pulp of the stem, mixed with green ginger, is given to persons bitten by mad dogs.

Bengal: Sij—; *Burma:* Shasoung—; *Canarese:* Dubbakalli, Dundukalli, Elegalli, Gutagalli, Yellakalli—; *Deccan:* Patteoon—; *Hasada:* Eteke—; *Dehra Dun:* Thor, Thuor—; *Gujerati:* Thorkantalo—; *Hindi:* Katathohar, Senhur, Sij, Thor, Thuhar, Thura—; *Jaunsar:* Suru—; *Kolami:* Etki—; *Lambadi:* Motataria—; *Madras:* Ileikkalli—; *Malayalam:* Ilakalli—; *Marathi:* Kandenivdung, Newrang, Nivdung—; *Mundari:* Burueteke—; *Porebunder:* Kantalo, Thorkantalo—; *Rajputana:* Raj, Tor—; *Sanskrit:* Patrasnuhi, Sehuda, Svarasana, Vajradruksha, Vajri—; *Tamil:* Ilakalli, Manjevi, Nanangalli—; *Telugu:* Akujemudu, Akukalli, Bonthajamudu—; *Urdu:* Zakum—; *Uriya:* Kolosiju, Siju—.

8. **Euphorbia antiquorum** Linn. Sp. Pl. (1753) 450; Wight Ic. t. 897.—Plate 851.

A large shrub or small tree 4.5-9 m. high; trunk stout, sometimes nearly 30 cm. diam., cylindric or fluted; bark thick, rough, brown; branches numerous, curving upwards, stout, fleshy, green, jointed,

with 3-5 wide thick sinuate wings narrowed at either end in each joint and coarsely repand-crenate. Leaves small, 6-13 mm. long, subsessile, obovate-oblong, rounded or subtruncate, cuneate, fleshy, glabrous, soon deciduous, which gives the plant a leafless appearance; stipular spines short, sharp, divaricate, persistent. Involucres 3-nate, forming small pedunculate cymes, the central flower sessile, female, the 2 lateral on long stout pedicels; bracteoles numerous, laciniate; glands 5, large, broader than long. Stamens numerous. Capsules nearly 13 mm. diam., cocci compressed, glabrous; styles 2-fid.

Distribution: Throughout the hotter parts of India and Ceylon.

The medicinal properties are the same as those of *E. tirucalli* (Yunani).

A plaster, prepared from the roots and mixed with asafoetida, is applied externally to the stomachs of children suffering from worms. The bark of the root is purgative, and the stem is given in decoction in gout.

The juice, which flows from the branches, is used as a purgative to relieve pain in the loins. It is an acrid irritant in rheumatism and tooth-ache. When taken internally, it acts as a drastic purgative. It is also employed in nervine diseases, dropsy, palsy, deafness and amaurosis. It is a popular application to warts and other cutaneous affections.

The juice is prescribed as a purge and deobstruent in those visceral obstructions and dropsical affections which are consequent on long-continued intermittent fever. Externally, mixed with margosa oil, it is applied to limbs which have become contracted from rheumatism.

In Bombay, the root is mixed with country liquor to make it more intoxicating, and the juice is used to kill maggots in wounds, and is dropped into the ear to cure earache, a practice common to many parts of India. In the Konkan, the stem is roasted in ashes, and the expressed juice, with honey and borax, given in small doses to promote the expectoration of phlegm.

The Mundas of Chota Nagpur use the milky juice to poison and catch fish. The juice is also used as a purge : mixed in a raw egg it gives as many stools as there are drops of the juice in the mixture.

A preparation from this plant is given as a cure for cough by the Santals (Campbell).

In Cambodia, the latex is used as an emetic; the core of the plant is administered in dysentery and in febrile conditions.

The milky juice, whether given internally or applied externally, is useless in the treatment of snake-bite (Mhaskar and Caius).

Arabic: Zaqqumehindi—; *Belgaum:* Tindarisend—; *Bengal:* Bajvaran, Lariyadaona, Narasij, Shibgach, Tekatasij—; *Burma:* Pyathal, Shasoungpyathal, Shazanvji, Tazaung—; *Cambodia:* Chanlat day—; *Canarese:* Bontegalli, Bontekalli, Chaturagalli, Jadekalli, Mundugalli—; *Deccan:* Tidharisend, Tindharisend—; *Gujerati* Tandharisend—; *Hasada:* Siddaru—; *Malayalam:* Chaturakalli, Kalli, Katakkalli—; *Marathi:* Naraseja, Narsej—; *Michi:* Shidu—; *Mundari:* Eteke, Etete, Siddaru, Marangeteke—; *Persian:* Zaqqumehindi, Zaqunniyaehindi—; *Sadani:* Sid—; *Sanskrit:* Simhunda, Snuhi, Tridharaka, Vajrakantaka, Vajri—; *Santal:* Etkec—; *Sinhalese:* Daluk—; *Tamil:* Amudangam, Kalli, Kandiravam, Kaniravam, Kodiravam, Mavirukkam, Murittargalli, Sadurakkalli, Saduchi, Sunakkudam, Tiruvargalli, Vachiram, Vachirangam, Valangalli—; *Telugu:* Bommajemudu, Bontajemudu, Bontakalli, Peddajemudu, Simhundumu—; *Tulu:* Darekalli—; *Urdu:* Zakum—; *Uriya:* Dokahanasiju, Lohasiju—.

9. **Euphorbia royleana** Boiss. in DC. Prodr. XV, pt. 2 (1862) 83.—*E. pentagona* Royle Ill. 329, t. 82, f. 1.—PLATE 852A.

A shrub or small tree; branches whorled, about 5 cm. diam., 5-7-angled the ridges wavy with a pair of stipular spines 5-7.5 mm. long at the crest of each wave. Leaves alternate, 10-15 cm. long, spathulate, mucronate, very thick and fleshy, sessile. Involucres 1.3 cm. across, yellow, in compact sessile 3-flowered cymes arising from the sinus between the nodes. Capsule 1.5 cm. diam., pale grey, 3-lobed, pedunculate.

Distribution: Himalaya, up to 6,000 ft., from the Indus to Kumaon, Salt Range.

The acrid milky juice possesses cathartic and anthelmintic properties.

Beas: Chu, Chunga, Surs—; *Chenab:* Chula—; *Dehra Dun:* Thor, Thuor—; *Garhwal:* Surai—; *Hindi:* Senhur, Shakarpitan, Thor—; *Jaunsar:* Suru—; *Jhelum:* Suli—; *Kumaon:* Sohund—; *Punjab:* Shakarpitan, Thar, Thor—; *Rajputana:* Thor—; *Ravi:* Chun—; *Salt Range:* Tordanda—; *Sutlej:* Suro, Tsui—.

10. **Euphorbia thomsoniana** Boiss. in DC. Prodr. XV, 2 (1862) 113.—PLATE 848A.

Quite glabrous; stem simple, sparingly leafy, 30 cm. high from a stout perennial stock, unbranched, scaly at the base. Leaves 2-3.8 by 1.3-2 cm., sessile, elliptic or ovate obtuse or subacute, coriaceous, dull yellow when dry, upper and under surfaces alike, nerves few obscure ascending. Floral leaves broader. Rays 3-6, longer than the floral leaves. Involucral leaves 2 suborbicular. Involucres 3 mm. broad, campanulate, glabrous without, with 4 hairy lines within; lobes small, short, fimbriate; glands substipitate, transversely oblong; styles long, slender. Capsule shortly stipitate, oblong, 8 mm. long, 6 mm. diam.; cocci not separate by a deep sulcus, oblong. Seed pale oblong, 4 mm. long, quite smooth; caruncle small, peltate.

Distribution: Kashmir, 10,000—12,000 ft.

The crushed root-stocks are employed by the natives of Kuram as detergents for washing the hair, and, when boiled, are given as purgatives.

Kashmir: Hirtiz—.

11. **Euphorbia helioscopia** Linn. Sp. Pl. (1753) 459.—PLATE 852B.

A glabrous, erect, annual herb; stems 15-45 cm., usually much-branched at the top. Stem-leaves alternate, shortly stalked, obovate or spathulate, 1.3-5 cm.; lower ones smaller, tip finely toothed. Inflorescence umbellate, rays often very short. Involucres 4-toothed;

glands yellow, rounded, entire. Styles free. Capsule 3 mm. diam., smooth; seeds minutely net-veined.

Distribution: Punjab and W. Himalaya. Introduced into the Nilgiris.—Afghanistan to the Atlantic, Japan. Introduced elsewhere.

The plant is used as a hydragogue cathartic, and the juice is applied to remove warts.

The milky juice is applied to eruptions, and the seeds are given with roasted pepper in cholera (Honigberger).

The juice is used in the form of a liniment in neuralgia and rheumatism, and the root is employed as an anthelmintic (Murray).

The latex is successfully used for the removal of warts in South Africa.

Afrikaans: Melkbos, Melkgras, Wolfsemelk—; *Chinese:* Tse Ch'i—; *English:* Cat's Milk, Churn-staff, Sun Spurge, Wartwort—; *French:* Lait de couleuvre, Omblette, Reveille matin, Tithymale—; *Hindi:* Hirruseeah, Mahabi—; *Italian:* Esula, Titimaglio, Titimalo, Tutumaglio—; *Kharan:* Gurbagund—; *Malta:* Cat's Milk, Spurge, Sun Spurge, Erba calenzuola, Tenghoud—; *Punjab:* Chatriwal, Dudal, Gandabute, Kulfadodak—; *South Africa:* Milkweed, Spurge—; *Spanish:* Lechetrezna, Mirasol—.

12. **Euphorbia dracunculoides** Lam. Encyc. Méthod. II (1786) 428.—Plate 853A.

An annual dichotomously much-branched herb, 30-45 cm. high; stems many from the root, erect, leafy. Leaves of the stem sessile, 3.2-7 cm. by 3-6 mm., linear or linear-lanceolate, subacute, base acute (rarely rounded); floral leaves broader at the base and shorter. Involucres broadly campanulate, subsessile, solitary, 2.5 mm. across at the mouth, glabrous outside, pubescent inside; lobes short, ovate, ciliolate; glands semilunate, horned; filaments pubescent. Capsules 3-4 mm. diam., styles 1 mm. long, free to the base, shortly 2-fid at the apex. Seeds 3 mm. long, ellipsoid, rounded at the base, grooved down one side, with an arillode at the oblique depressed apex; testa whitish, leprous, rugose or tuberculate.

Distribution: Throughout India in the plains and low hills.—Arabia, tropical Africa.

The fruit is used to remove warts.

Bengal: Chhagulpuputi, Jychee—; *Punjab:* Kangi, Richni, Sudab—; *Santal:* Parwa—; *Telugu:* Tillakada—.

13. **Euphorbia longifolia** D. Don Prodr. 62.

Tall, glabrous or sparsely hairy. Leaves 2.5-10 cm., coriaceous sessile linear-oblong obtuse or acute, nerves obsolete. Involucral leaves 3-4 orbicular or broadly ovate and apiculate; rays few short; involucres campanulate villous within; lobes rounded villous; styles long slender, deeply 2-fid, connate below the middle. Capsule 6 mm. diam., rather broader than long, shortly stipitate, covered obscurely and sparsely with conical warts, sulci deep between the globose cocci. Seeds 2.5 mm. long, broadly obovoid, pale, smooth; caruncle small.

Distribution: Nepal.

The juice is applied to fistulous sores in Kashmir and Punjab.

14. **Euphorbia granulata** Forsk. Fl. Aegypt.-Arab. (1775) 94.

A small hispidly-villous plant with a perennial root; stems many from the root, prostrate, hispid, leafy, 7.5-15 cm. long, very brittle. Leaves opposite, coriaceous, 2.5-5 by 1.2-3 mm., obliquely oblong or obovate-oblong, rounded or retuse at the tip, quite entire, villous on both surfaces, base narrow or rounded or subcordate; petioles short; stipules minute, ciliolate. Involucres minute, axillary and on short leafy branchlets, subsessile, turbinate, 1.2 mm. long; gland usually without a limb. Capsules 1.6 mm. diam.; cocci hirsute, rounded at the back, not keeled; styles very short, 2-fid. Seeds quadrangular, bluntly pointed, 1.2 mm. long, faintly pitted; testa very mucous when wetted.

Distribution: Punjab, Rajputana Desert, Malwa, Chota Nagpur, W. Peninsula.—Afghanistan, Arabia, Egypt, Canary Islands.

In Las Bela, the plant is considered to purify the blood (Hughes-Buller).

Jhalawan: Gwandar—; *Kharan:* Shirgonah—; *Las Bela:* Khirwal—; *Santali:* Kanthaarak—.

15. **Euphorbia sanguinea** Hochst. & Steud. in DC. Prodr. XV, 35.

Annual, glabrous, glaucescent, branching from the base; branches elongate, prostrate, with branchlets. Leaves from a very unequal base, elliptic-rhomboid, subincurved, very obtuse, on the margin often calcareous serrulate, stipules elongate, from a 2-3-fid base, often subulate. Involucres in the uppermost axils solitary, dense, forming leafy branchlets, inside and outside glabrous, lobes linear-lanceolate, entire, glands with a rosy appendix which is irregularly and deeply 3-5-partite. Capsules glabrous, cocci keeled, seed ovate-tetragonous, with a few irregular folds.

Distribution: Baluchistan.—Afghanistan, tropical Arabia, Africa.

When used for medicinal purposes it is prepared like "bhang" (Hotson).

The Sutos use it as an application to sore nipples in suckling mothers.

Brahui: Meshir—; *Pretoria:* Spurge—; *Suto:* Kxamamaswana, Selwe, Tatampoi-e-nyenyane—.

16. **Euphorbia turcomanica** Boiss. Cent. Euphor. 13; DC. Prodr. XV, 34.

Glabrous or short hairy, branching from the base; branchlets short, prostrate, fragile, very much dichotomously branched. Leaves small, very oblique at the base, elliptic, subincurved, obtuse, entire, or at the apex obsoletely denticulate-repand; stipules lanceolate, dentate. Involucres axillary, spreading-hairy, inside glabrous, lobes triangular, glands narrowly appendiculate or without appendix. Capsules spreading-hairy, cocci keeled, seed oblong acute tetragonous, with irregular depressions and slightly wrinkled.

Distribution: Baluchistan.—Persia, Mesopotamia.

In Baluchistan, it is boiled and used as a medicine for gripe (Hotson).

Brahui: Meshir—.

Buxus Linn.

Evergreen shrubs or trees. Leaves opposite, coriaceous, entire, penninerved. Flowers greenish yellow, monoecious, in very short erect dense axillary racemes. Male flowers ebracteate; sepals 4, in 2 series, imbricate; stamens as many as sepals and opposite them, free; anthers ultimately recurved; ovary rudimentary. Female flowers: sepals 6, the 2 outer much smaller, imbricate; ovary 3-celled; ovules 2 in each cell, pendulous; styles 3, short, thick. Capsule ovoid, tipped by the persistent styles, loculicidally 3-valved, valves 2-horned by the split styles, endocarp splitting away from the coriaceous exocarp. Seeds oblong, black, shining.—Species 25.—Palæotemperate.

B. balearica Lam. is used medicinally in Majorca.

The root bark of *B. sempervirens* Linn. var. *arborescens* Lamk. and var. *suffruticosa* Lamk. is officinal in Portugal.

1. **Buxus sempervirens** Linn. Sp. Pl. (1753) 983.—Plate 853B.

A much-branched shrub or small tree. Leaves nearly sessile, opposite, narrowly lanceolate or ovate, 2.5-7.5 cm., entire, usually obtuse. Flowers small, yellow-green, strongly scented, in small, axillary heads or spikes; the terminal flower usually female, the rest male. Male flowers: Sepals 4; stamens 4, opposite to the sepals, far protruding; ovary rudimentary. Female flowers: Sepals 6; ovary triangular, 3-celled, top flat, the 3 corners ending in thick, short styles. Capsule ovoid, 1.3 cm. long, 3-horned; seeds 3-6, small.

Distribution: Temperate Himalaya, Bhutan, Punjab, Waziristan.—W. Asia, N. Africa, Europe.

The leaves are good for headache, pain, prolapsus ani.—The seeds are bitter, astringent, tonic to the heart and brain; used in stomatitis, to dry the bad humours of the liver (Yunani).

A tincture from the bark is used as a febrifuge.

The wood is diaphoretic.

The leaves are bitter, purgative, and diaphoretic, useful in rheumatism and syphilis.

Afghanistan: Shandalaghune—; *Arabic:* Bakas—; *Catalan:* Boix—; *Dutch:* Boxboom, Palm, Palmboom—; *English:* Box Tree, Bush-tree, Duolgeon, Dwarf Box, Evergreen Box—; *French:* Bois bénit, Bouis, Buis, Buis commun, Ozanne—; *German:* Buchsbaum—; *Greek:* Pyxos—; *Italian:* Bosso, Bossolo, Busso, Buxo, Mortella—; *Jaunsar:* Papri, Sansadu—; *Kashmir:* Chikri—; *North-Western Himalayas:* Chikri, Papri, Poppar, Sansadu, Shamshad—; *Persian:* Shamshad—; *Portuguese:* Buxo—; *Punjab:* Chikri, Papar, Paprang, Papri, Papur, Shamshad, Shumaj—; *Roumanian:* Cimisu, Cimsu, Merisor turcesc—; *Russian:* Buksus, Samshit—; *Spanish:* Boj—; *Swedish:* Buxbom—; *Urdu:* Shamshad—.

BRIDELIA Willd.

Shrubs or trees. Leaves alternate, usually quite entire, sometimes with strong nerves and prominent cross veins. Flowers monoecious or dioecious, small or minute, in axillary or spicate clusters, sessile or shortly pedicellate; bracts small, scale-like. Male flowers numerous. Perianth double. Calyx-segments 5, valvate. Petals 5, short, scale-like, stalked or spathulate. Disk broad, pulvinate or adnate to the calyx-tube. Stamens 5; filaments connate below in a column, which bears a terminal pistillode, free and spreading above; anther-cells 2, parallel. Female flowers few or solitary. Calyx-segments usually narrower than in the male. Disk double, the inner forming a membranous central truncate cone often enclosing the young ovary. Ovary 2- (rarely 3-) celled, glabrous; ovules 2 in each cell; styles free or shortly united below, forked or subentire. Fruit a small drupe with 1-2 usually single-seeded cocci or pyrenes. Seed with usually fleshy, sometimes membranous albumen; cotyledons thin or fleshy.—Species 60.—Palæotropical and subtropical.

1. Leaves rigidly coriaceous .... 1. *B. retusa.*
2. Leaves membranous .... 2. *B. montana.*

The bark is astringent, the leaves purgative.

B. ferruginea Benth. and *B. micrantha* Baill. are used medicinally in Nigeria and in the Gold Coast, *B. schlechteri* Hutch. is used in South Africa, *B. cambodiana* Gagnep. in Cambodia.

1. **Bridelia retusa** Spreng. Syst. Veg. III (1826) 48.—Plate 854.

A small or moderate sized deciduous tree, spinous when young; bark grey. Leaves numerous, 7.5-15 by 3.8-6.3 cm., rigidly coriaceous, elliptic-oblong, obtuse, subacute or rounded at the apex, with entire or slightly crenulate margins, bright green and glabrous above (turning pinkish-brown before falling), glaucous and usually finely tomentose beneath, base usually rounded (rarely cordate); main nerves prominent, straight, 15-25 pairs with finely reticulate venation between; petioles 6-13 mm. long; stipules ovate-lanceolate, usually oblique at the base, deciduous. Flowers dioecious, greenish yellow, sessile or shortly pedicellate, crowded in dense axillary clusters or on long axillary or terminal, sometimes paniculate spikes often exceeding the leaves. Calyx greenish, tinged with red, 4 mm. diam., glabrous; segments fleshy, triangular-ovate, acute, spreading. Petals greenish white, those of the male flowers obovate, pectinate, those of the female flowers subspathulate. Disk of male flowers thick and pulpy, of the female flowers truncate, enclosing the ovary. Style short. Drupe fleshy, seated on the persistent slightly enlarged calyx, 8 mm. diam., purple-black, edible.

Distribution: Throughout India and Ceylon.

The plant is pungent, bitter, heating; useful in "vata", lumbago, hemiplegia.—The bark is good for the removal of urinary concretions (Ayurveda).

The root and the bark are valuable astringents.

The bark is used as a liniment with gingelly oil in rheumatism.

Ajmere: Lamkana—; *Assam:* Kohir—; *Banswara:* Angnera—; *Bengal:* Kantakoi—; *Bhil:* Asana, Gunjan, Katiain—; *Bhumij:* Karika—; *Bombay:* Asauna, Assana, Phatarphod—; *Burma:* Seikche, Seikchi, Seikgyi, Tseichyi, Tseipche—; *Canarese:* Asana, Garige, Goje, Gojji, Guju, Havugandha, Kogyamunji, Maguva, Muljane, Mullahonne, Mullubenga, Mulluhonne, Nasinagandha, Nasinage, Phatterphodi, Siruhonne—; *Central Provinces:* Karka, Kassei, Kassi—; *Chittagong:* Kamkui—; *Deccan:* Sun—; *Dehra Dun:* Gaya, Khaja—; *Garhwal:* Gauli, Gaya, Khaja—; *Garo:* Kashi—; *Gond:* Kassei—; *Gujerati:* Asana, Ekalakanto, Monj—; *Hindi:* Gauli, Kaj,

Kajja, Kassi, Khaja—; *Kalaghor:* Goli—; *Kharwar:* Kaji, Kanj—; *Khond:* Rugendi—; *Kolami:* Kaka, Kharaka—; *Konkani:* Kongy—; *Kurku:* Karka—; *Lambadi:* Makhiro—; *Lepcha:* Pengji—; *Malayalam:* Chalaru, Komanji, Mullukayani, Mulluvenya, Mulluvenna—; *Mandevi:* Haklo—; *Marathi:* Asana, Asanakutgi, Gunjan, Kantakauchi, Katiain, Kutki, Palapasana, Patharaphoda, Phataraphoda—; *Mechi:* Katakuchi—; *Monghyr:* Kuj—; *Mundari:* Karakadaru—; *Nepal:* Geio—; *Portuguese India:* Bentka—; *Punjab:* Mark, Pathor—; *Rajbanshi:* Nanda—; *Rajputana:* Angnera, Lamkana—; *Ramnagar:* Goli—; *Reddi:* Annemu—; *Saharanpur:* Ekdania, Gondni—; *Sanskrit:* Asana, Ekadivi, Ekavira, Mahavira, Sakridvira, Suvarika—; *Santali:* Kadrupala—; *Saora:* Annemu—; *Sinhalese:* Kattakaala, Ketakele—; *Tamil:* Adamarudu, Asuvai, Kadugai, Komanji, Malaivengai, Mullumarudu, Mulluvengai, Mulvengai, Sem, Singattan, Siruvengai—; *Telugu:* Annemu, Bontavegisa, Duriyamaddi, Ettapattaka, Kodaratti, Koramaddi, Koramanu, Kosengi, Peddayanemu, Poramanu, Selaka—; *Tinnevelly:* Adamaradu—; *Tulu:* Mullugunje—; *Uriya:* Kasi, Kosi—.

2. **Bridelia montana** Willd. Sp. Pl. IV (1805) 978.—PLATE 855A.

A large shrub or small straggling tree without thorns; twigs glabrous, verrucose. Leaves 7.5-15 by 3.8-9 cm., usually elliptic-obovate, sometimes elliptic or oblong, usually rounded, sometimes acute at the apex, base rounded or somewhat narrowed, entire or undulate, bright green above, more or less pale and glaucous beneath, glabrous or nearly so; lateral nerves 8-16 pairs, more or less arched; petiole 2.5-7.5 mm. long, swollen; stipules caducous. Flowers monoecious and dioecious, greenish yellow, in small axillary clusters. Calyx 2.5 mm. long, segments erect, narrowly triangular in the male, deltoid in female flowers. Petals shorter than the sepals, obovate, keeled on the back, coarsely toothed in the male, entire in female flowers. Disk rather small in the male, nearly enclosing the ovary in female flowers. Fruit 6 mm. long, ovoid, seated on the unenlarged calyx (black when ripe?).

Distribution: Sub-Himalayan tract from the Jhelum eastwards, Khasia Hills, Central Provinces, Bihar, Orissa, Upper Burma.

The root and the bark are much used as an astringent medicine in Bombay and Goa.

The plant has been credited with anthelmintic properties.

Assam: Kaisho—; *Bombay:* Asano—; *Canarese:* Kittoe, Sidigulige—; *Cutch:* Asana—; *Goa:* Faturfoda—; *Gujerati:* Asano—; *Hindi:* Geia, Gondni, Kargnalia, Khaja, Kusi—; *Khond:* Balli—; *Kumaon:* Kurgnulia—; *Marathi:* Asana—; *Nepal:* Geio—; *Saharanpur:* Gondni—; *Tamil:* Vengaimaram—; *Telugu:* Gundu bigalu, Panchavoni, Pantangi, Pantegi, Pantiga, Sannakodari, Tellavegisa—; *Uriya:* Nuanali—.

CLEISTANTHUS Hook. f.

Trees or shrubs. Leaves alternate, bifarious, entire. Flowers monoecious, small or minute, in axillary clusters or spikes, all sessile or the female shortly pedicellate. Male flowers : Calyx-segments 5, valvate. Petals 5, short, scale-like, stalked or spathulate. Disk broad, entire or sinuate. Stamens 5; filaments connate below in a central column, bearing a pyramidal or 3-lobed pistillode, free and spreading above; anther-cells parallel. Female flowers : Calyx less deeply lobed than in the male, cupular under the ovary. Disk double, the inner conic or turbinate, more or less enclosing the young ovary. Ovary 3- (rarely 4-) celled, usually clothed with long hairs; ovules 2 in each cell; styles 3, free, 2-fid. Fruit a sessile or stipitate subglobose or depressed capsule with three 2-valved cocci. Seeds without an aril or arillode; albumen copious or scanty; cotyledons thin or fleshy, often folded.—Species 110.—Palæotropics.

The genus is not therapeutically defined.

1. **Cleistanthus collinus** Benth. in Gen. Pl. III, 268.—*Cluytia collina* Roxb. Corom. Pl. t. 169.

A small, rarely moderate sized tree, with orbicular, obovate or elliptic leaves, 2.5-10 cm. long by 2-7.5 cm. broad, glaucous beneath and small green flowers, 6.3-7.5 mm. diam., appearing with the new leaves, the males clustered, the females often solitary sessile. Capsules somewhat 3-gonous, woody, chestnut-coloured when ripe,

shining, 2-2.5 cm. diam., sometimes dehiscing with a considerable report on hot evenings.

Distribution: Bihar, Chota Nagpur, Satpura, Range, Chand Dist., W. Peninsula.

A poisonous plant.

An extract of the leaves and fruit acts as a violent gastro-intestinal irritant.

In Chota Nagpur, the fruit and bark are employed to poison fish; the latter is also considered a useful application in cutaneous diseases. For severe headache, the head and upper part of the body are bathed in water in which the leaves have been steeped.

Berar: Ghara—; *Canarese:* Badedarige, Bodadaraga, Kadagar-gari, Kodasige—; *Central Provinces:* Ganari, Garar, Garari—; *Hasada:* Parasudaru—; *Hindi:* Garari, Garrar—; *Kharwar:* Kergali—; *Khond:* Kadise—; *Kolami:* Larshuter, Parasu, Pas, Pasu—; *Madras:* Odukkan—; *Malayalam:* Nilappala—; *Marathi:* Garari—; *Naguri:* Kargelodaru, Kargelungdaru—; *Sanskrit:* Indra-yava, Kaudigam, Kutaja, Nandi—; *Santali:* Kargalli—; *Sinhalese:* Madaru—; *Tamil:* Nilaippalai, Odaichi, Odan, Odishi, Odu, Odugu, Oduppai, Oduvan—; *Telugu:* Kadise, Korshe, Korsi, Vadise—; *Uriya:* Karada, Koroda—.

ANDRACHNE Linn.

Herbs, undershrubs, or slender shrubs. Leaves alternate, petiolate, membranous, usually small, entire. Flowers small, monoecious, pedicellate; male flowers clustered in the axils; females solitary. Male flowers: Perianth usually double. Calyx 5-6-lobed or -partite. Petals 5-6, small or 0. Glands of the disk as many or twice as many as the petals. Stamens 5-6, alternate with the petals; anthers erect, the cells parallel. Pistillode small. Female flowers: Calyx-segments usually larger than in the male. Petals minute or 0. Ovary 3-celled; ovules 2 in each cell; styles short, 2-fid or 2-partite. Capsule of three 2-valved cocci. Seeds curved, rugose, estrophiolate; albumen fleshy; embryo curved; cotyledons broad, flat.—Species 15.—Tropics and subtropics.

A. ovalis Mull. Arg. is used medicinally in South Africa.

1. **Andrachne cordifolia** Muell. Arg. in DC. Prodr. XV, 2, 234.—PLATE 855B.

An erect deciduous or subdeciduous shrub 1.2-2.4 m. high with stems up to 2.5 cm. diam. Bark smooth, very pale brown or ashy with rather conspicuous circular lenticels. Twigs slender, green. Leaves 2.5-10 by 1.3-4.5 cm., elliptic or ovate, the larger oblong, rounded at both ends, membranous, glabrous above, thinly pubescent beneath. Petiole slender 7.5-33 mm. long. Flowers 5-7.5 mm. diam., green, the calyx persisting in the female and enlarged to 1 cm. diam. in fruit. Pedicels 1.3-3.8 cm. long, very slender. Capsule 7.5 mm. diam., depressed-globose, obscurely 3-lobed, dark brown.

Distribution: Central and W. temperate Himalaya, 5,000—8,000 ft.—Afghanistan.

A poisonous plant.

The twigs and leaves are said to kill cattle when browsed in the early morning on an empty stomach (Stewart).

Beas: Chirmutti, Mutkar, Pin—; *Chenab:* Bersu—; *Garhwal:* Bhatula—; *Jaunsar:* Bharti, Bhartoi—; *Jhelum:* Gurguli, Kurkni—; *Punjab:* Gurguli, Kurkuli, Kurkni—; *Ravi:* Barotri, Madare—; *Sutlej:* Tsatin—.

PHYLLANTHUS Linn.

Herbs, shrubs, or trees. Leaves bifarious or distichous, alternate, entire, the branchlets with their leaves often resembling pinnate leaves; stipules usually narrow or 0. Flowers small, monoecious, axillary or on old nodes; males usually many, fascicled, subsessile or pedicellate, rarely few or solitary; females in the same or distinct axils with longer pedicels, solitary; or few. Perianth simple. Male flowers : Sepals 4-6, free or very shortly connate, imbricate and more or less 2-seriate. Disk glandular (rarely 0). Stamens 3 (rarely 4 or 5), in the centre of the flower; filaments free or connate; anthers 2-celled, oblong or didymous (rarely reniform), the cells parallel or diverging; dehiscence extrorse, vertical or transverse. Pistillode 0. Female flowers. Sepals as in the male. Petals 0. Ovary usually 3-celled; ovules 2 in each cell; styles free or connate,

usually 2-fid, with slender arms (rarely dilated). Fruit of 3 crustaceous or coriaceous (rarely bony) 2-valved cocci with or without a separable coriaceous (rarely fleshy) epicarp, sometimes a 4-celled berry or a drupe with a 3-4-celled bony endocarp. Seeds 3-gonous; testa crustaceous; hilum without a strophiole; albumen fleshy; cotyledons flat or flexuous.—Species 500.—Temperate and tropical, excluding Europe and N. Asia.

Sepals 5-6 in both sexes. Stamens 5 or 3. Styles 3. Flowers monoecious

I. Stamens 5 in 2 series, the 3 inner filaments connate .... 1. *P. reticulatus.*

II. Stamens 3; filaments united in a long or short column, rarely free and recurved

a. Anthers erect, slits vertical; connective usually produced Fruit large, fleshy, with 3 bony 2-valved cocci. Styles united below. A tree .... 2. *P. emblica.*

1. Leaves scattered, cuneate-obovate. Capsule smooth .. 3. *P. maderaspatensis.*

2. Leaves close-set, distichously imbricating, oblong or linear-oblong. Capsules echinate .... 4. *P. urinaria.*

b. Anthers didymous or reniform, slits very short. Fruit a capsule. Styles once bifid

1. Stipules peltate .... 5. *P. simplex.*

2. Stipules simple, not peltate

Styles minute, bilobed. Seeds with regular parallel ribs .... 6. *P. niruri.*

The genus is strongly astringent, diuretic, and cathartic.

The following species are used medicinally in China—*P. emblica* Linn.—; in Cambodia and Cochin China—*P. emblica* Linn., *P. niruri* Linn., *P. urinaria* Linn.—; in the Philippine Islands—*P. niruri* Linn., *P. reticulatus* Poir., *P. urinaria* Linn.—; in Brazil—*P. conami* Sw., *P. lateroides* H. B. K., *P. niruri* Linn.—; in Guiana—*P. conami* Sw., *P. epiphyllanthus* Linn., *P. guyanensis* Klotsch, *P. niruri* Linn., *P. urinaria* Linn.—; in the West Indies—*P. niruri* Linn.—; in the Gold Coast—*P. floribundus* Muell. Arg., *P. niruri* Linn., *P. reticulatus* Poir.—; in Madagascar—*P. casticum* Soy.-Will., *P. madagascariensis* Muell.-Arg.—; in La Reunion—*P. casticum* Soy.-Will., *P. niruri* Linn., *P. phyllireaefolius* Poir., *P. urinaria* Linn.—; in East Africa—*P. reticulatus* Poir.—; in Northern Rhodesia —*P. engleri* Pax.—.

1. **Phyllanthus reticulatus** Poir. Encyc. Méthod. V (1804) 298.—*Anisonema multiflora* Wight Ic. t. 1899.—Plate 857.

A large glabrous or pubescent straggling or climbing shrub (in the forests along the Indus in Sind climbing over the largest trees); branches smooth or lenticellate. Leaves 1.3-3.2 by 0.8-2 cm., variable, oblong or elliptic, sometimes almost rotundate, obtuse or acute, thin, glabrous or nearly so, pale beneath, base rounded, acute or subcordate; main nerves few, slender; petioles 1.5-3 mm. long, slender, stipules 1.5 mm. long, ovate, acute sometimes bristle-pointed. Flowers axillary, the males in fascicles of 2-6, the females solitary; pedicels 1.5-6 mm. long, slender. Calyx glabrous, reaching 2.5 mm. long; segments oblong, very obtuse, alternating with the glands of the disk. Male flowers : Stamens 5, the 3 inner connate into a column, the 2 outer free, shorter. Female flowers : Ovary 5-10-celled; ovules 2 in each cell, superposed; styles 3, minute, 2-lobed. Fruit a purple fleshy berry 4 mm. diam., globose, smooth and shining. Seeds 8-16 (usually 10), irregularly 3-gonous, finely granulate.

Distribution: Throughout tropical India, Ceylon.—Tropical Africa, China, Malay Islands.

The fruit is astringent to the bowels; useful in inflammations, "vata" and diseases of the blood (Ayurveda).

The bark is considered alterative and attenuant, and is prescribed in decoction in the quantity of four ounces or more twice daily.

The leaves are employed as a diuretic and cooling medicine in Sind.

The juice of the leaves is used medicinally in the Konkan. It is made into a pill with camphor and cubebs, which is allowed to dissolve in the mouth as a remedy for bleeding from the gums. It is also reduced to a thin extract along with the juice of other alterative plants and made into a pill with aromatics; this pill is given twice a day, rubbed down in milk, as an alterative in heat of the blood.

In Lakhimpur, the juice of the leaves is used for diarrhœa in infants (Carter).

In Ashanti, the leaves are mixed with palm nuts (*Elæis guineensis*) and made into a broth, which is given to newly delivered women to relieve them.

On the Gold Coast, the stems are used to cure sore eyes, the juice from them being blown into the eyes.

The Rongas and Europeans of East Africa use the powdered leaf as a local application to sores, burns, and suppurations, and chafing of the skin. The Rongas also apply it to venereal sores.

Assam: Amluki—; *Bengal:* Panjuli—; *Bombay:* Pavana—; *Canarese:* Anamsule, Chippulinellu, Huli, Karesuli, Karihuli, Sannahagesoppu—; *Ceylon:* Mipullanti, Pula, Pullanti—; *Deccan:* Buinowla, Kalemadhkajhar—; *Fanti:* Nkokobro—; *Gorakhpur:* Sikat—; *Gujerati:* Datwan—; *Hindi:* Buinowla, Kalemadhkaper, Makhi, Panjoli, Panjuli—; *Konkani:* Kaili—; *Lambadi:* Kombhoiro—; *Malayalam:* Kattuniruri, Kilanelli, Nirnelli, Niruri—; *Marathi:* Pavan—; *Merwara:* Kabonan—; *Punjab:* Panjuli—; *Rajputana:* Kabonan—; *Ronga:* Tetenya—; *Sanskrit:* Bahupraja, Bahupushpa, Kamboji, Kambojini, Krishnakambhoji—; *Sind:* Kamohi, Kamu, Pikapiru—; *Sinhalese:* Welkyla—; *Tagalog:* Malaiba, Malatinta, Tinatinam, Tintatintahan—; *Tamil:* Abirangi, Karuppuppilanji, Karunelli, Kattukkilanelli, Melanelli, Nirppul, Nirppula, Nirppulanji, Pul, Pula, Pulanji—; *Telugu:* Nallapuli, Nallapurugudu, Nelapurugudu, Pandibarangi, Pulisar, Purugudu—; *Tulu:* Kakesoppu—; *Twi:* Awobe—; *Uriya:* Bonotihudi, Jojangi, Phajoli—; *Visayan:* Matangolang, Sungotolang—; *Zamboanga:* Nipin—.

2. **Phyllanthus emblica** Linn. Sp. Pl. (1753) 982.—*Emblica officinalis* Gærtn. Fruct. II (1791) 122; Wight Ic. t. 1896.—Plate 858.

A deciduous small or middle sized tree with crooked trunk and spreading branches; bark greenish grey, peeling off in conchoidal flakes; branchlets glabrous or finely pubescent, 10-20 cm. long, often deciduous. Leaves subsessile, 10-13 by 2.5-3 mm., closely set along the branchlets, distichous, light green, glabrous, narrowly linear, obtuse, imbricate when young, having the appearance of pinnate leaves; stipules ovate, finely acute. Flowers greenish yellow, in axillary fascicles on the leaf-bearing branchlets, often on the naked portion below the leaves, with fimbriate bracts at the base. Male flowers numerous, on short slender pedicels. Sepals 6, oblong,

obtuse, 1.2 mm. long. Disk 0. Anthers 3 on a short central column. Female flowers few, subsessile. Sepals as in the male. Disk a lacerate cup. Ovary 3-celled; styles connate at the base, irregularly twice 2-fid with acute lobes. Fruit 1.3-1.6 cm. diam., fleshy, globose, with 6 obscure vertical furrows, pale yellow, of three 2-seeded crustaceous cocci. Seeds 6, 3-gonous.

Distribution: Throughout tropical and subtropical India, wild or planted, Ceylon.—China, Malay Islands.

The fruit is acrid, sour, bitter sweetish; cooling, alexiteric, carminative, alterative, laxative, tonic, antipyretic; useful in burning sensations, vomiting, biliousness, urinary discharges, thirst, leprosy, constipation, inflammations, erysipelas, piles, anæmia, strangury; used in biliousness, "kapha", thirst, sweats, anuria, poisoning, "tridosha", ophthalmia, incipient blindness.—The leaf is used in ophthalmia and incipient blindness.—The seed is acrid, sweet; aphrodisiac, antipyretic; useful in biliousness, asthma, bronchitis, leucorrhœa, vomiting, "vata" (Ayurveda).

The flowers are cooling and aperient.—The fruit is acrid, sour, cooling; astringent, tonic, expectorant, vulnerary, laxative, improves the appetite; useful in diseases of the heart, liver complaint, cold in the nose, thirst, piles, biliousness, eye troubles; stops nasal hæmorrhage; purifies the humours of the body (Yunani).

The root, the bark, and the ripe fruit are astringent. The flowers are refrigerant and aperient.

The unripe fruit is cooling, diuretic, and laxative. The exudation from the incisions on the fruit is used as an external application in inflammation of the eye.

In the Konkan, the juice of the fresh bark with honey and turmeric is given in gonorrhœa.

The leaves are, in Baroda, used as an infusion with fenugreek seeds in cases of chronic dysentery, and are also considered a bitter tonic. In the same locality, the milky juice is considered a good application to offensive sores.

In Cambodia, the leaves are used in the preparation of antithermic lotions and baths, and the decoction of the roots is given in myalgia following upon some febrile condition.

Every part of the plant is equally useless in the antidotal treatment of snake-bite (Mhaskar and Caius) and scorpion-sting (Caius and Mhaskar).

Arabic: Ambliy, Amlaj—; *Assam:* Amlaki, Amluki, Sohmyrlain—; *Bengal:* Ambolati, Amla, Amlaki, Amlati, Amulati, Aunlah, Yeonlah—; *Bombay:* Amla, Avala, Avalkati, Avla—; *Cambodia:* Ngop—; *Burma:* Hziphyu, Shabju, Siphiyusi, Tasha, Zibyu, Ziphiyusi—; *Canarese:* Amalaka, Chattu, Dadi, Dhanya, Dhatri, Nelli, Sudhe—; *Central Provinces:* Amla, Anla—; *Ceylon:* Toppinelli—; *Chinese:* An Mo Le—; *Cuttack:* Alathanda—; *Deccan:* Amla, Owla, Ownla—; *English:* Emblic Myrobalan Tree—; *Garo:* Ambari—; *Gond:* Aunri, Lalla, Milli, Nalli, Nilli, Usir—; *Gujerati:* Amali, Ambala, Ambri, Amla, Bhoza, Bhozaamali—; *Hindi:* Amalaci, Amla, Amlika, Anola, Anuli, Anvula, Anvurah, Anwerd, Aonla, Aungra, Aunra, Daula—; *Khond:* Durga—; *Kol:* Miral—; *Kolami:* Aura—; *Konkani:* Anvallo, Dogranvalli, Dogranvallo—; *Kumaon:* Aonla—; *Kurku:* Aunre—; *Kwang Tung:* Yeou Kan Tse—; *Lambadi:* Ambla—; *Lepcha:* Amlokung, Suom—; *Malayalam:* Amalakam, Nelli—; *Marathi: Anvala,* Aonli, Avala, Arola, Bhuiawali—; *Nepal:* Amla—; *North-Western Provinces:* Amla, Aoula—; *Persian:* Amelah, Amuleh—; *Portuguese:* Mirabolano emblico—; *Punjab:* Ambal, Ambli, Ambul, Amla, Aonla—; *Sanskrit:* Adiphala, Akara, Amalaki, Amamalakam, Amlika, Amraphala, Amrita, Amritaphala, Bahuphali, Dhatri, Dhatrika, Dhatriphala, Jatiphala, Karshaphala, Kayastha, Pancharasa, Rochani, Shanta, Shiva, Shriphala, Shriphali, Tishya, Tishyaphala, Triphala, Vayastha, Vrishya, Vrittaphala—; *Santal:* Meral—; *Saora:* Peddavusirika—; *Sinhalese:* Awusadanelli, Nelli, Nellika—; *Tamil:* Amalagam, Andakoram, Indul, Kattunelli, Nelli, Perunelli, Sirottam, Tattiri, Toppunelli—; *Telugu:* Amalakamu, Amalaki, Nelli, Pullayusirika, Triphalamu, Usirika, Usirikaya, Usiriki—; *Tulu:* Nelli—; *Urdu:* Anwala—; *Uriya:* Khondona, Onola—.

3. **Phyllanthus maderaspatensis** Linn. Sp. Pl. (1753) 982; Wight Ic. t. 1895, f. 3.—Plate 859A.

Annual but sometimes woody at the base, very variable in habit; stems glabrous, 30-90 cm. long, erect, ascending or decumbent.

Leaves scattered, variable, 6-32 by 3-16 mm., glabrous, obovate-cuneate, rounded, truncate or somewhat obcordate at the apex, mucronate, much tapering into a very short petiole, glaucous and with a few lateral nerves conspicuous beneath; stipules peltate, lanceolate, very acute. Flowers axillary, the male flowers minute in small clusters, subsessile, the female larger, solitary, shortly pedicellate. Sepals 6, obovate, obtuse, green with white margins. Stamens 3; filaments connate. Styles 3, distinct, very small, 2-lobed. Capsules 3 mm. diam., depressed-globose, glabrous, 3-lobed. Seeds 1.5 mm. long, 3-gonous, rounded on the back, muriculate in fine lines (beautifully marked like basket-work), brown.

Distribution: Drier parts of India, Ceylon.—Tropical Africa, Arabia, Java, China, Australia.

The leaves are expectorant, diaphoretic; useful in strangury and sweats.—The seeds have a bad taste; carminative, laxative, astringent to the bowels, tonic to the liver, diuretic, diaphoretic; useful in bronchitis, earache, griping, ophthalmia, ascites (Yunani).

In Southern India, an infusion of the leaves is given for headache.

Arabic: Marur—; *Gujerati:* Kanochha—; *Hindi:* Hazarmani Kanocha, Kanochha—; *Persian:* Marurshatu—; *Porebunder:* Bakrado—; *Telugu:* Nalausereki—; *Urdu:* Kanodcha—.

4. **Phyllanthus urinaria** Linn. Sp. Pl. (1753) 892.—*P. leprocarpus* Wight Ic. t. 1895, f. 4.—Plate 859B.

Annual, 30-60 cm. high, glabrous or nearly so. Stems erect, slightly branched; leaf-bearing branchlets short, flattened or slightly winged. Leaves closely placed, distichously imbricate, sessile or nearly so, 6-13 by 2.5-6 mm., oblong or linear-oblong, rounded and apiculate at the apex, pale beneath, glabrous, base rounded, usually oblique; stipules peltate, very acute, from a broad base. Flowers minute, axillary, subsessile, solitary, yellowish. Sepals 0.8-1 mm. long, oblong, rounded, not enlarged in fruit. Capsules 3 mm. diam., globose, scarcely lobed, echinate. Seeds 1.5 mm. long, 3-gonous, rounded on the back, transversely furrowed.

Distribution: Tropics generally.

The fruit and the plant are acrid, sour, cooling, bitter, sweetisl alexipharmic; useful in thirst, bronchitis, leprosy, anæmia, urinary discharges, anuria, biliousness, asthma, hiccough (Ayurveda).

The plant is much used as a diuretic in dropsical affections, also in gonorrhœa and other genito-urinary troubles.

In Chota Nagpur, the root is given to sleepless children.

In La Reunion, the plant is considered diuretic, sudorific, depurative, and emmenagogue. It is given as a drink in dysentery and cystitis.

In Cambodia, the plant is used as a bitter, tonic, astringent, and febrifuge.

Bengal: Hazarmani—; *Burma:* Miziphiyuani—; *Cambodia:* Prak phle—; *Canarese:* Kempukiranelli—; *Gujerati:* Kharsadabonyaanmali, Kharsadabonyaansari—; *Hindi:* Hazarmani, Lalbhuinanvalah—; *La Reunion:* Petit tamarin rouge—; *Malay:* Ambin buoh—; *Malayalam:* Chirukizhukanelli, Chukannakizhanelli—; *Marathi:* Lalmundajanvali—; *Sanskrit:* Adhyanda, Ajata, Ajuta, Amala, Aphala, Aruha, Bahupatra, Bahuphala, Bahupushpa, Charati, Chorata, Dalasparshini, Dridhapadi, Hilolika, Jada, Jharika, Jhatamala, Mala, Nilolika, Putrashronika, Shiva, Sukshmadala, Sukshmaphala, Tali, Tamalika, Tamalini, Tamravalli, Uchchata, Vishaghni, Vishvaparni, Vitunnaka, Vituntika, Vrishya—; *Santali:* Badarzhapni—; *Sinhalese:* Ratpittawaka—; *Tagalog:* Ibaibaan—; *Tamil:* Shivappunelli—; *Telugu:* Ettausirika—.

5. **Phyllanthus simplex** Retz. Obs. Bot. fasc. 5 (1789) 29.—PLATE 860.

A glabrous perennial herb or an undershrub, usually with a long tap-root; branches compressed. Leaves distichous, numerous, 13-20 by 3-6 mm., subsessile, closely placed and often overlapping, linear-oblong, obtuse, apiculate; stipules peltate, sagittate, brown, scarious. Flowers usually solitary, on slender axillary pedicels, the female larger than the male. Sepals about 0.8 mm. long, oblong, obtuse, those of the female flowers slightly enlarged in fruit. Stamens 3, distinct; anthers didymous, the slits very short, so that when the cells are confluent the dehiscence seems transverse. Styles short, 2-fid. Capsules 2.5 mm. diam., globose, slightly 3-lobed, crustaceous,

usually slightly rough with minute prominences but not echinate.
minute tubercles in irregular lines, very dark brown.
Seeds 1.2-1.5 mm. long, 3-gonous, rounded on the back, covered with

Distribution: Throughout India, Ceylon.—Malay Islands, China, Pacific Islands.

The natives use the fresh leaves, flowers and fruit, with cumin seeds and sugar, of each equal parts made into an electuary, for the cure of gonorrhœa, a teaspoonful is given twice a day. The fresh leaves, bruised and mixed with butter, milk, make a wash to cure the itch in children (Roxburgh).

The root is used in Chota Nagpur, as an external application for mammary abscess (Campbell).

Gujerati: Motibhonyaanmali—; *Marathi:* Bhuiavali, Motibhuiavali—; *Porebunder:* Motibhonyaanmari—; *Santali:* Tandimeral—; *Telugu:* Uchchiyusirika—.

6. **Phyllanthus niruri** Linn. Sp. Pl. (1753) 981; Wight Ic. t. 1894.—Plate 861.

Annual herb 30-60 cm. high, quite glabrous; stem often branched at the base, angular; leaf-bearing branchlets slender, spreading. Leaves numerous, subsessile, distichous often imbricating, 6-13 by 3-6 mm., elliptic-oblong, obtuse (rarely subacute), glaucous beneath, base rounded; petioles very short; stipules lanceolate-subulate, very acute. Flowers yellowish, very numerous, axillary, the males 1-3, the females solitary. Sepals of male flowers 0.6 mm. long, rounded, those of the female 1.2 mm. long, oblong, subacute, with white margins, not enlarged in fruit. Stamens 3; anthers sessile on a short column. Styles minute, free, 2-lobed. Disk of male of minute glands; of female annular, lobed. Capsules 2.5 mm. diam., depressed-globose, smooth, scarcely lobed. Seeds 1.5 mm. long, 3-gonous, rounded and with longitudinal regular parallel ribs on the back.

Distribution: Tropics generally except Australia.

The therapeutic properties are the same as those of *P. urinaria;* used also as a diuretic and in menorrhagia (Ayurveda).

Ashanti: Bommaguwakyi—; *Bengal:* Bhuiamla, Sadahazurmani—; *Bombay:* Bhuiavala—; *Brazil:* Erva, Pombinha—; *Burma:* Miziphiyu—; *Canarese:* Kiranelligida, Kirinelligide—; *Deccan:* Bhuinanvalah—; *French:* Herbe du chagrin—; *Gujarat:* Bhonyaanmali—; *Hindi:* Bhonyaabali, Bhuinanvalah, Jaramla, Sadahazurmani—; *La Reunion:* Petit tamarin blanc—; *Malayalam:* Kirganelli, Kizhanelli, Kizhkkayinelli—; *Marathi:* Bhuiavali—; *Philippines:* Hierba de San Paulo, Hierba de San Pedro—; *Porebunder:* Bhonyaanmari—; *Sanskrit:* Adhyanda, Ajata, Ajuta, Amala, Amlika, Amrita, Aphala, Bahupatra, Bahupatri, Bahuphala, Bahupushpi, Bhudatra, Bhudhatri, Bhumyamalaki, Bhuparva, Charati, Chorata, Dalaparshini, Dridhapadi, Hilolika, Jada, Jharika, Jhatamala, Kshetramali, Mala, Nilolika, Putrashronika, Shiva, Sukshmadala, Sukshmaphala, Uchchata, Vishaghni, Vishvaparni, Vitunnaka, Vituntika, Vrishya—; *Sind:* Niruri—; *Sinhalese:* Pittawaka—; *Spanish:* Yerba de guinina—; *Tamil:* Kilanelli, Kilkkaynelli—; *Telugu:* Nelausirika, Nelavusari—; *Twi:* Bommaguwakyi—; *Urdu:* Bhuiamla—; *Uriya:* Bhuiaola—; *West Indies:* Petit tamarin blanc, Quinine créole, Yerba de quinina—.

Cicca Linn.

Tree. Leaves thin, distichous. Flowers minute, in dense clusters, axillary or racemed. Sepals 4 (rarely 5). Stamens 4, free, anthers oblong. Styles 4, free. Fruit fleshy with 3-4-celled bony endocarp.—Species 1.—Asia.

1. **Cicca disticha** Linn. Mant. 124.—*Phyllanthus distichus* Muell.-Arg. Linnaea XXXIV, 75.—Plate 862A (under *Phyllanthus distichus* Muell.-Arg.).

Tree, about 4.5-6 m. tall, with erect branches at top; branchlets slender. Leaves distichous thin, obliquely ovate acute, base rounded, tip acute, 5 cm. long, 2.5 cm. wide, light green; petioles 2.5 mm. long. Flowers very small in slender racemes 5 cm. long from the thick branches. Sepals orbicular, pink at base. Disk of male of large glands; of females annular crenate. Fruit yellow-green, 2.5 cm. long, globose, fleshy, acid, obscurely 6-lobed, depressed at both ends.

Distribution: Cultivated in India and Malay Peninsula.

The fruit is slightly bitter, fragrant, acrid, sour; improves appetite; useful in bronchitis, biliousness, urinary concretions, piles; increases "vata" (Ayurveda).

The fruit is very sour; tonic to the liver; useful in thirst, biliousness, vomiting, constipation; purifies and enriches the blood (Yunani).

The root and the seed are cathartic. The fruit is acrid and astringent.

The root and the leaves are useless in the antidotal and symptomatic treatment of snake-bite (Mhaskar and Caius).

Bengal: Hariphul, Loda, Noari—; *Bombay:* Harparawri, Raiavala—; *Burma:* Thimbawzibyu, Thinbawnibyu, Thinbozihpyu—; *Canarese:* Aranelli, Karinelli, Kirinelli, Kirunelli, Rayaranelli—; *English:* The Country Gooseberry—; *French:* Brignollier—; *Goa:* Cherambola—; *Hindi:* Chalmeri, Harfarauri—; *Konkani:* Rojanvalli, Rosanvalli—; *La Reunion:* Cherimbelier—; *Malay:* Chermela—; *Malayalam:* Arinelli, Nellipuli—; *Pampangan:* Iba—; *Sanskrit:* Ghana, Komalavalkala, Lavali, Lavaliphala, Lavani, Pandu, Skandhaphala, Srigdha, Sugandhamula—; *Sinhalese:* Ratanelli—; *Tagalog:* Banquilin, Bangquiling, Iba, Yba—; *Tamil:* Arunelli, Sadadaram, Sadagam—; *Telugu:* Rachayusirika,, Ratsavusiriki—; *Tulu:* Karinelli—; *Urdu:* Harpharuri—; *Uriya:* Narokoli—; *Visayan:* Bangquiling, Layohan, Poras—.

GLOCHIDION Forst.

Evergreen trees or shrubs. Leaves alternate, bifarious, shortly petiolate, entire. Flowers small, monoecious or dioecious, in axillary clusters. Perianth simple. Petals 0. Disk 9. Male flowers: Sepals 6 (rarely 5), spreading, in 2 series, imbricate. Stamens connate in an ellipsoid or oblong sessile column; anthers 3-8 (sometimes more), the cells linear, dehiscing extrorsely; connectives produced as free points or connate in an umbonate head. Pistillode 0 or rarely minute and hidden between the anthers. Female flowers: Calyx usually of 6 short imbricate sepals or shortly tubular and unequally toothed or cleft. Ovary 3-15-celled; ovules 2 in each cell; styles connate in a globose, columnar conic or subclavate column,

lobed or toothed at the tip. Fruit a capsule of 3 or more 2-valved cocci, often with twice as many lobes as cells, globose or orbicular and depressed, or intruded at the base and apex, crowned by the often enlarged style; cocci coriaceous or crustaceous, the epicarp separable or not. Seeds hemispheric or laterally compressed; testa crustaceous with often a succulent coat; albumen copious, fleshy; cotyledons flat. —Species 160.—Tropical Asia, Polynesia.

1. Anthers 3. Calyx irregularly 4-6- toothed or -lobed. Capsules 10 mm. diam., 6-8-lobed .... 1. *G. hohenackeri.*
2. Flowers in umbellate clusters on short usually supraaxillary peduncles. Capsules glabrous .... 2. *G. zeylanicum.*

The genus is therapeutically inert.

1. **Glochidion hohenackeri** Bedd. For. Man. in Fl. Sylv. (1873) CXCIII.—*G. lanceolarium* Dalz. in Dalz. & Gibs. Bomb. Fl. (1861) 235 (non Voight).

A middle sized tree quite glabrous. Leaves 6.3-15 by 2.5-4.5 cm., elliptic-lanceolate, acutely or obtusely acuminate, base usually acute; main nerves 6-10 pairs, slender; petioles 3-4 mm. long; stipules 3-4 mm. long, obliquely triangular, acute. Male flowers greenish yellow, on capillary pedicels reaching 13 mm. long. Calyx partite nearly to the base; sepals 4 by 1.5 mm., oblanceolate-oblong, rounded at the apex, fleshy. Anthers 3, about 2 mm. long, including the produced pointed connective, which is about 0.5 mm. long. Female flowers few, sessile, in small clusters usually of a deeper yellow than the male. Calyx glabrous, 2.5 mm. long, cup-shaped, with 4-6 irregular short lobes or teeth. Ovary glabrous; style subglobose, 3-4-notched at the apex, broader than the ovary. Capsules 1 cm. diam., nearly sessile, turnip-shaped, 6-8-lobed, much depressed in the centre, crowned by the subglobose style in the sunk top. Seeds red, 2 in each cell, 5 mm. long, rounded on the back, quite smooth.

Distribution: W. Peninsula, Chota Nagpur, Orissa.

The bark is given medicinally when the stomach revolts against food (Campbell).

Canarese: Banavara, Nirchalli, Nirchelli, Nirjani, Sullai—; *Malayalam:* Kuluchan—; *Marathi:* Bhoma—; *Uriya:* Baniakandhum, Chikni, Kalchia—.

2. **Glochidion zeylanicum** A. Juss in Tent. Euphorb. (1824) 107.

A small tree, quite glabrous or densely pubescent, with shining ovate-lanceolate, or oblong, often curved or oblique leaves, attaining 23 by 9.5 cm., with rounded or cordate base on one or both sides and acute or shortly acuminate apex, secondary nerves 6-9, petiole short, stout, 3.8-6 mm. Flowers monoecious. Male 6 mm. diam., yellowish-green or reddish on pedicels 6 mm. long, stamens 5-7, not connate but connivent, filaments hardly any, connective shortly produced, with short free tips, pistillode small. Female outer sepals erect, reddish, suborbicular, stylar column with 5-6 minute lobes. Fruit 7.5-10 mm. diam., depressed globose, not lobed (when fresh), apex not intruded, beaked by the stylar column, pedicel scarcely 5 mm. long.

Distribution: W. Peninsula.

The bark is used as a stomachic.

Canarese: Banda, Savregidda—; *Malayalam:* Nirvetti—; *Sinhalese:* Hunukirilla—; *Tamil:* Kumbalam—; *Telugu:* Itepulla—.

FLUEGGEA Willd.

Shrubs. Leaves small distichous alternate. Flowers minute axillary pedicelled, apetalous, males numerous clustered, females solitary. Male flowers : Sepals 5, subpetaloid imbricate. Stamens 3-5, with as many disk glands; filaments free. Pistillodes 3, large with recurved tips. Female flowers as male but disk annular. Ovary 1-3-celled; styles elongate recurved 3-bifid. Fruit globose, epicarp fleshy breaking irregularly or into 2-valved cocci.—Species 6. —Tropics of the Old World.

1. Leaves 2.5-7.5 cm. .... 1. *F. virosa.*
2. Leaves 1.6-2.5 cm. .... 2. *F. leucopyrus.*

F. virosa Baill. is used medicinally in the Gold Coast, and in Guiana.

1. **Flueggea virosa** Baill. Etud. Euphorb. 593, t. XXVI, f. 39. —*F. microcarpa* Bl. Bijdr. 580.—*Chorisandra pinnata* Wight Ic. t. 1994.—PLATE 862B (under *F. microcarpa* Bl.).

A large unarmed glabrous shrub; bark grey, with small lenticular specks; branchlets angular. Leaves variable, thin, 2.5-7.5 by 1.6-4.5 cm., elliptic or obovate, rounded, obtuse (rarely subacute), glabrous, somewhat glaucous and reticulately veined beneath, base usually acute; main nerves 5-7 pairs, very slender; petioles 3-6 mm. long. Flowers in axillary clusters from a crowd of minute bracts, the males very numerous, the females usually 1-5 (rarely several). Male flowers: Pedicels filiform, sometimes reaching 1 cm. long. Sepals 1.5 by 0.8 mm., obovate-oblong, obtuse, concave. Stamens 3-5; filaments slender, free, sometimes 2 mm. or more long, with alternate glands at the base. Pistillode large, 3-fid. Female flowers: Pedicels rarely reaching 6 mm. long. Sepals as in the male. Ovary glabrous, ovoid or subglobose; styles 3, about 1.2 mm. long, deeply divided into 2 linear acute segments. Fruit globose, of 2 kinds, one 3-4 mm. diam., with a dry pericarp, the other 8 mm. diam., white with a fleshy pericarp which is edible. Seeds rounded on the back with acute faces, very minutely punctulate.

Distribution: Throughout India, Malay Peninsula.—China, Malay Islands, Australia, tropical Africa.

The plant is sweetish; cooling, tonic, aphrodisiac; good in strangury, biliousness, blood diseases (Ayurveda).

The juice of the leaves, or the leaves made into a paste with tobacco, are used to destroy worms in sores.

The West Ashantis use the roots to cure gonorrhœa. They boil the whole plant in water and wash themselves in the water to "become strong."

The Ewe people of Togoland use the leaves to cure constipation. For this purpose they are boiled and the water is drunk.

All parts of the plant are equally useless in the treatment of snake-bite (Mhaskar and Caius).

Ashanti: Nkangnaa—; *Bombay:* Kantepuwan, Pandharphali—; *Burma:* Konchiny a—; *Canarese:* Belahuli, Bilisuli, Gudahale—; *Dehra Dun:* Rithoul—; *Ewe:* Esre, Hesre—; *Ga:* Gbekebiiablecho—; *Goa:* Parpo—; *Gujerati:* Shaunavi—; *Hausa:* Tsa—; *Hindi:* Dalme, Patala—; *Lambadi:* Jarigaro—; *Malayalam:* Perinklavu—; *Marathi:* Kodarsi—; *Merwara:* Halepan, Salipan—; *Sanskrit:* Apiyadruma, Bhuriphala, Dhusara, Nilishila, Panduphali, Patali, Vrittabijaka—; *Saora:* Jungjang—; *Sokoto:* Tsa, Tswa—; *Tamil:* Irubulai, Pula, Varadbula, Vedbula, Vellaippula—; *Telugu:* Mekarayi, Sulamunta, Tellapuli, Tellapurugudu—; *Uriya:* Janjingi, Kanilehya—.

2. **Flueggea leucopyrus** Willd. Sp. Pl. IV (1805) 757; Wight Ic. t. 1875.—*Securinega leucopyrus* Muell.-Arg. in DC. Prodr. XV, pt. 2, 451.

A large rigid bush with somewhat straggling branches; branchlets angular, slender, leafy, usually ending in sharp spines. Leaves 1.6-2.5 by 1.3-1.6 cm. (rarely reaching 3.8 by 2.5 cm.), obovate, or obcordate, or rotundate, glaucous and reticulately veined beneath. Flowers in axillary clusters from a crowd of minute bracts, the males very numerous, the females usually 1-5 (rarely several). Male flowers: Pedicels filiform, sometimes reaching 10 mm. long. Sepals 1.6 by 0.8 mm., obovate-oblong, obtuse, concave. Stamens 3-5; filaments slender, free, sometimes 2 mm. or more long, with alternate glands at the base. Pistillode large, 3-fid. Female flowers : Pedicels rarely reaching 6 mm. long. Sepals as in the male. Ovary glabrous, ovoid or subglobose; styles 3, about 1.25 mm. long, deeply divided into 2 linear acute segments. Fruit globose, about 6 mm. diam., smooth, quite white when ripe, 3-celled; styles 3, bifid.

Distribution: Punjab, Sind, W. Peninsula, Ceylon, Burma.

The juice of the leaves, or the leaves made into a paste with tobacco, are used to destroy worms in sores.

The plant is said to be a fish poison.

Afghanistan: Perapastawane—; *Canarese:* Bilchuli, Gudahale, Huli—; *Central Provinces:* Challamanta, Salemanta—; *Ceylon:* Mudpullanti—; *Goa:* Parpo—; *Gujerati:* Shinavi—; *Madras:* Mappul-

landi—; *Malayalam:* Perinklavu—; *Marathi:* Kandekuvana, Pandharphali—; *Nepal:* Achal—; *North-Western Provinces:* Aintha, Hartho—; *Porebunder:* Tumari—; *Punjab:* Bata, Bhathi, Gargas, Girk, Girthan, Kakun, Vanuthi—; *Rajputana:* Halepan, Salepan—; *Sanskrit:* Apiyadruma, Bhuriphali, Panduphali, Svetakamboja—; *Sind:* Kiran—; *Sinhalese:* Hinkatupila—; *Tamil:* Irubulai, Mudbulanji, Mulluppulatti, Pula, Pulanji, Varadbul, Varadbula, Vedbula, Vellaippula, Vellaippulanji—; *Telugu:* Challamunta, Mekarayi, Puli, Tellapulisaru, Tellapurugudu—.

SAUROPUS Bl.

Small shrubs or undershrubs. Leaves alternate, distichous, membranous, quite entire; stipules minute. Flowers pedicellate, monoecious, minute, axillary, clustered or solitary. Perianth simple. Male flowers: Sepals connate in a disk-like urceolate or turbinate 6-lobed or 6-cleft calyx; mouth small with superficial thickenings that meet round the stamens. Petals 0. Disk 0. Stamens 3; filaments connate in a short truncate 3-gonous column; anthers sessile on the angles of the column, the cells linear or subglobose, dehiscing extrorsely. Pistillode 0. Female flowers: Sepals connate in a 6-cleft accrescent calyx. Petals 0. Disk 0. Ovary ovoid or globose, 3-celled, rounded or concave at the apex; ovules 2 in each cell; styles 3, very short, spreading, 2-fid or 2-partite. Fruit globose or depressed, fleshy or coriaceous, 6-valved or rupturing irregularly, containing 6 indehiscent 3-gonous crustaceous or bony cocci. Seeds with fleshy albumen; embryo straight or nearly so; cotyledons flat, broad.—Species 20.—Indo-Malaya.

The genus is therapeutically inert.

1. **Sauropus quadrangularis** Muell.-Arg. in Linnaea XXXII (1863) 73.—*Phyllanthus rhamnoides* Roxb. Fl. Ind. III (1832) 663 (non Willd.).

A low slender branched shrub 30-45 cm. high; young shoots angular. Leaves 13-21 by 8-13 mm., thin, elliptic-oblong or obovate, apiculate, base obtuse or acute; main nerves 4-5 pairs; petioles 1.3 mm. long; stipules minute, lanceolate-subulate. Male flowers: Pedicels

filiform, reaching 6 mm. long. Calyx 6-lobed, divided about half way down; lobes about 1.3 mm. long, triangular acute; basal appendages vaulting over the small staminal column. Female flowers solitary from the uper axils. Pedicels short. Calyx divided almost to the base; sepals 4 by 5 mm., obovate, rounded at the apex, veined. Fruit 8 mm. diam., depressed-globose; cocci 4 mm. long, rounded on the back, with acute faces, 3-gonous, smooth, pale.

Distribution: Bihar, Chota Nagpur, W. Peninsula, Burma.

The dried leaves are smoked in tonsilitis.
Telugu: Tellavusirika—.

BREYNIA Forst.

Shrubs or small trees. Leaves small, alternate, petiolate, entire, often distichous. Flowers monoecious, axillary, minute. Perianth simple. Pedicels distinct, solitary or the males fascicled, the fascicle rarely replaced by a short raceme. Male flowers: Calyx turbinate or hemispheric with a truncate limb, the margin often thickened and lobulate opposite the minute inflexed and rounded lobes. Petals 0. Disk 0. Stamens 3; filaments connate in a column; anthers slender, adnate to the whole length of the column, the cells linear, parallel, distinct. Pistillode 0. Female flowers : Calyx coriaceous, turbinate, campanulate or rotate; limb broadly and shortly 6-lobed, often much accrescent and disciform in fruit. Petals 0. Disk 0. Staminodes 0. Ovary 3-celled, fleshy above, globose or truncate or depressed at the apex; ovules 2 in each cell; styles 3, sessile or connate in a short column, each 2-fid or 2-lobed; or stigmas 3, simple, minute, immersed in a cavity at the top of the ovary. Fruit globose or depressed, more or less succulent, indehiscent, or with a 6-valved pericarp enclosing 3-6 imperforate indehiscent cocci. Seeds with membranous testa; albumen fleshy; cotyledons broad; radicle long.—Species 12.—Africa, Asia, Polynesia.

1. Calyx not or scarcely enlarged in fruit .... 1. *B. rhamnoides.*
2. Calyx greatly enlarged in fruit .... 2. *B. patens.*

The genus is not therapeutically defined.

1. **Breynia rhamnoides** Muell.-Arg. in DC. Prodr. XV, 2 (1866) 440.—*Melanthesa rhamnoides* Bl.; Wight Ic. t. 1898.—Plate 863.

A large glabrous shrub with many horizontal branches; bark yellowish; branchlets angular, glabrous. Leaves numerous, thin, distichous, spreading, 1.6-3.8 by 1-2.5 cm., elliptic, obtuse or subacute, pale beneath, base subacute or rounded; petioles 2.5 mm. long; stipules 1.5 mm. long, subulate from a triangular base, persistent. Flowers minute, the males usually in small fascicles, the females mostly solitary; pedicels filiform, variable in length. Male flowers: Calyx turbinate or subcampanulate; mouth entire or obscurely lobed. Staminal column truncate at the apex, produced beyond the adnate anthers. Female flowers: Calyx cup-shaped, 6-lobed; lobes acute. Ovary exserted, oblong, truncate; styles very short. Fruit globose, scarcely reaching 6 mm. diam., smooth, succulent, dull red. Seeds 3 mm. long without an aril; testa imperforate except at the very base.

Distribution: Throughout tropical India, Ceylon, Malay Peninsula.—China, Malay Islands, Philippines.

The bark is astringent.

In Behar, the dried leaves are smoked like tobacco, in cases in which uvula and tonsils are swelled.

Canarese: Bamari, Gandupachcheri, Huli, Kadunugge, Kempuhili, Suli—; *Hindi:* Surasaruni—; *Madras:* Manippullandi—; *Malay:* Suruyian—; *Malayalam:* Chuvannaniruri, Kattuniruri, Pavilappula—; *Oudh:* Tikkar—; *Sanskrit:* Aruni—; *Tamil:* Kattuniruri, Manippulanji, Pavalappul, Pavalappula, Pamari, Sigappuppula—; *Telugu:* Ettaballi, Ettapurugudu, Nagatipachchari, Pagadapu, Pagadapurugudu, Vellari, Yellari—.

2. **Breynia patens** Rolfe in Journ. Bot. N. S. XI (1882) 359. —*Melanthesa obliqua* Wight Ic. t. 1898.—*M. turbinata* Wight Ic. t. 1897 (per errorem in tabula truncata).

A shrub or small tree with spreading branches; bark smooth, grey; branchlets slender, angular, glabrous. Leaves numerous, distichous, 1.3-2.8 by 0.8-1.6 cm., membranous, broadly elliptic,

obtuse, glabrous, glaucous beneath; main nerves 3-5 pairs; petioles 1.6 mm. long; stipules 2.5 mm. long, subulate from a triangular base, persistent. Flowers appearing with the young leaves, axillary on filiform pedicels, the males in the lower, the females in the upper axils. Male flowers pale yellow, in fascicles of 1-3. Calyx turbinate or campanulate, 2.5-4 mm. long, truncate or crenate at the mouth. Anthers adnate throughout their entire length to the acute staminal-column which is produced beyond them. Female flowers greenish. Pedicels shorter than in the male. Calyx deeply divided into 6 rounded apiculate segments. Ovary truncate; styles 3, stout, 2-fid. Fruit depressed-globose, 13-17 mm. diam., faintly 3-lobed, orange-red, fleshy but dehiscent, seated on the greatly enlarged coloured calyx. Seeds 3-quetrous with an orange-yellow aril; testa perforate at the hilum.

Distribution: Tropical Himalaya, Assam, Chittagong, Burma, W. Peninsula, Ceylon.

The plant is astringent to the bowels; useful in "vata", inflammations, diseases of the blood.—The juice of the stem is used in conjunctivitis (Ayurveda).

Gujerati: Kamboi—; *Hindi:* Kalamahomad, Kambhi, Kedakamboi, Khedakamboi—; *Malayalam:* Peruniruri—; *Marathi:* Kalichikali—; *Porebunder:* Kamboi, Kalikamboi—; *Sanskrit:* Bahupraja, Bahupushpa, Devadaru, Kamboji—; *Saora:* Kintaipude—; *Sinhalese:* Walmurunga—; *Telugu:* Davadari—; *Uriya:* Deulopohora, Medhokotahotoru—.

PUTRANJIVA Wall.

Trees. Leaves alternate, evergreen, entire or serrulate, penninerved and reticulately veined. Flowers monoecious or dioecious, axillary, pedicellate, the males clustered, the females subsolitary. Perianth simple. Male flowers: Calyx 3-6-lobed; lobes imbricate. Petals 0. Disk 0. Stamens 2-4 in the centre of the flower; filaments free or more or less connate; anthers erect, the cells parallel. Pistillode 0. Female flowers: Calyx as in the male. Petals 0. Disk 0. Ovary ovoid, 2-3-celled; ovules 2 in each cell; styles short, spreading, dilated, with broad fleshy arms. Fruit an ovoid or globose

drupe; endocarp hard, 1-celled. Seed solitary, ovoid; testa crustaceous; albumen fleshy; cotyledons broad, flat.—Species 4.—Indo-Malaya.

The genus is therapeutically inert.

1. **Putranjiva roxburghii** Wall. Tent. Fl. Nep. (1826) 61; Wight Ic. t. 1876.—PLATE 864.

An evergreen tree 9-12 m. high with pendent branches, nearly glabrous except the young shoots; bark corky, pale. Leaves coriaceous, dark green, shining, 6.3-10 by 2.2-3.8 cm., elliptic-oblong, acute, obtuse or shortly acuminate, distantly serrulate; main nerves numerous, slender, with reticulate venation between; petioles 6 mm. long; stipules small, triangular, acute, soon falling. Flowers dioecious. Male flowers very shortly pedicellate, crowded in rounded axillary clusters on the main or on short axillary branches. Sepals 2.5 mm. long, oblong, obtuse, ciliolate. Filaments 1.5-2 mm. long, more or less connate at the base; anthers globose, 1.5-2 mm. diam. Female flowers 1-3 in an axil; pedicels 8-13 mm. long. Sepals broadly elliptic, obtuse, concave, ciliolate, 2.5 mm. long. Ovary finely silky, 3-celled; styles 3, recurved, dilated into broad fleshy cresent-shaped stigmas. Drupe 1.3-2 mm. long, ellipsoid, rounded or pointed at the apex, narrowed at the base, white-tomentose, with pedicels 1.3-2.5 cm. long; stone pointed, rugose, very hard.

Distribution: Throughout tropical India, wild and cultivated, Ceylon, Burma.

The plant is fragrant, cooling, pungent; aphrodisiac, laxative, diuretic; good for the eyes; useful in biliousness, thirst, burning sensations, erysipelas, elephantiasis; causes "vata" and "kapha" (Ayurveda).

The leaves, the fruits, and the stones of the fruits are given in decoction in colds and fevers.

The bark and the seeds are useless in the antidotal treatment of snake-bite. The seeds are also useless as a collyrium and an errhine (Mhaskar and Caius).

The oil from the seeds has been examined by Krishna and Puntambekar (*Journ. Ind. Chem. Soc.;* June, 1931).

Bengal: Jiaputa, Putranjiva—; *Bombay:* Jewanputr, Jivputrak, Putajan, Putrajiva—; *Burma:* Badibyu, Egayit, Taukyat, Toukyap,

Toukyat—; *Canarese:* Amani, Menasinakale, Putrajiva—; *Ceylon:* Karippalai, Vichurunai—; *Chindwin:* Badibyu—; *Haldwani:* Juti—; *Hindi:* Jiaputa, Jivputrak, Joti, Juti, Patigia, Patji, Putajan, Putijia, Putrajiva, Putranjiva—; *Lambadi:* Kalo—; *Malayalam:* Pongalam, Ponkolam—; *Marathi:* Jewanputr, Jivputrak, Jiwanputr, Putajan, Putrajwa—; *North-Western Provinces:* Jiaputa, Joti, Juti, Putrajiva—; *Oudh:* Patji—; *Pegu:* Daukyat—; *Punjab:* Jiyaputra, Patajan—; *Ramnagar:* Juti—; *Reddi:* Veku—; *Sanskrit:* Ardhasadhaka, Apatyajiva, Garbhada, Garbhakara, Jivanaputra, Kumarajiva, Mavu, Pavitra, Putrajiva, Putranjiva, Shlipadapaha, Sidhida, Sutajivaka, Sutrajiva, Yashtipushpa—; *Santali:* Pitoj—; *Tamil:* Irukolli, Karupali, Karuppilai—; *Telugu:* Kadrajuvi, Kudrajinic, Kudurujivi, Kudurujuvir, Mahaputrajivi, Putrajivika—; *Uriya:* Bholokoli, Pohunjonia—.

ANTIDESMA Linn.

Trees or shrubs. Leaves alternate, entire; stipules narrow. Flowers dioecious, small or minute, in slender axillary or terminal simple or branched spikes or racemes. Perianth simple. Male flowers : Calyx 3-5- (rarely 6-8-) lobed or partite. Petals 0. Disk entire or lobed. Stamens 2-5 (rarely more), inserted (often irregularly) on or around the disk; filaments inflexed in bud; anthers lunate or didymous, the cells globose, approximate or distant; connective thickened. Pistillode minute, clavate or globose (rarely 2-fid), glabrous or hairy, sometimes obsolete. Female flowers : Calyx as in the male. Disk usually annular or pulvinate. Ovary 1-celled; ovules 2, pendulous; stigmas 2-4, usually short, 2-fid or 2-partite. Fruit a small drupe, more or less compressed, crowned by the sublateral or terminal stigmas. Seed small; albumen fleshy; cotyledons broad, flat.—Species 90.—Palæotropics.

1. Leaves 7.5-15 cm. .... 1. *A. bunius.*
2. Leaves 2.5-7.5 cm. .... 2. *A. zeylanicum.*

A. madagascariense Linn. is used medicinally in La Reunion; *A. venosum* E. Mey. in South Africa.

1. **Antidesma bunius** Spreng. Syst. Veg. I (1825) 826; Wight Ic. t. 819.—PLATE 865.

A small evergreen tree; bark greyish brown; young shoots hairy. Leaves variable, 7.5-18 by 3.2-6.3 cm., elongate-elliptic or elliptic-lanceolate or oblanceolate, acuminate, glabrous and shining above, base tapering; main nerves 10-12 pairs, arching; petioles 3 mm. long or less, stout; stipules lanceolate-subulate, hairy, quickly falling. Flowers reddish, numerous, in pubescent spikes, the spikes of the female simple, of the male often compound. Male flowers sessile. Calyx cupular, shortly 4-lobed. Disk lobed, glabrous. Stamens 3, exserted. Pistillode short, truncate. Female flowers on short pedicels 4-6 mm. long. Calyx shortly tubular, truncate. Disk cupular. Ovary glabrous; stigmas 3, large, short, dilated, spreading. Fruit 8 mm. diam., globose-ovoid, stalked, smooth, red, turning black.

Distribution: Nepal, Assam, Burma, Chota Nagpur, W. Peninsula, Ceylon.—China.

The acid leaves are used in snake-bites, and, when young, are boiled and used in syphilitic cachexia (Lindley).

The leaves are not an antidote to snake-venom (Mhaskar and Caius.)

Burma: Kywepyisin—; *Canarese:* Nayikute—; *Lepcha:* Kantjer, Kunchur—; *Malayalam:* Cherutali, Nulittali—; *Marathi:* Amati—; *Nepal:* Himalcheri—; *Pampangan:* Bignay—; *Philippines:* Bub-bugnay—; *Sinhalese:* Karawalakebella—; *Tagalog:* Bignai—; *Tamil:* Nolaidali—; *Telugu:* Anepu, Janupolari—; *Visayan:* Bugnai—.

2. **Antidesma zeylanicum** Lam. Encycl. Méthod. I (1783) 207.—*A. Alexiteria* Linn. Sp. Pl. (1753) 1027 (partim).—PLATE 866B (under *A. Alexiteria* Linn.).

Small tree, much-branched; twigs numerous, verticillate; young parts glabrous. Leaves numerous, on very short petioles, small, 3.2-5.6 cm., oval, acute at base, acuminate, apiculate, glabrous, and shining, pale green, rather thin. Spikes solitary or few, terminating twigs, 2-3.8 cm., slender. Flowers sessile, rhachis pubescent;

calyx-segments 3-4, hairy; stamens 3; ovary flask-shaped, glabrous, styles 2 or 3, recurved. Fruit small, 4 mm., ovoid, rather lop-sided, red.

Distribution: S. Deccan Peninsula, Ceylon.

The leaves in decoction are used for snake-bites (Balfour); but they are useless in the antidotal as well as in the symptomatic treatment (Mhaskar and Caius).

Sinhalese: Hinembilla—; *Tamil:* Nolaidali—;

JATROPHA Linn.

Herbs, shrubs, or trees, often glandular or prickly. Leaves alternate, often digitately lobed; stipules often ciliate. Flowers monoecious, in terminal cymes, the central flowers in the cyme or its forks usually female. Perianth usually double. Male flowers: Calyx 5- lobed or -partite, the segments often coloured, imbricate. Petals 5, free or connate. Disk entire or of 5 glands. Stamens numerous; filaments of all or of the interior only connate below; anthers erect, ovate or oblong, the cells parallel, contiguous. Pistillode 0. Female flowers: Calyx as in the male. Petals sometimes absent. Ovary 2-4-celled; ovules solitary in each cell; styles connate below, 2-fid above, the lobes entire or again 2-lobed. Fruit a capsule of 2-4 cocci; cocci 2-valved; endocarp crustaceous or hard. Seeds ovoid or oblong; testa crustaceous; albumen fleshy; cotyledons broad, flat.—Species 160.—Tropics and subtropics.

A. Evergreen tree or large shrub
   1. Leaves simple and ovate or 3-5-lobed .... 1. *J. glandulifera.*
   2. Leaves long-petioled, orbicular-cordate or 3-5- lobed or -angled .... 4. *J. curcas.*

B. Shrubs
   1. Leaves entire or 3-lobed, base cuneate, lobes entire ...... 2. *J. nana.*
   2. Leaves 5- lobed or -partite, lobes glandular-serrulate .... 5. *J. gossypifolia.*
   3. Leaves long-petioled, orbicular, palmately cut into many narrow entire or lobulate caudate acuminate segments .. 3. *J. multifida.*

Emetic and drastic purgative; rubefacient and discutient; anthelmintic.

The following species are used medicinally in Arabia—*J. glandulifera* Roxb.—; in Cambodia, the Philippine Islands, and Guiana—*J. curcas* Linn., *J. multifida* Linn.—; in Mexico—*J. macrorhiza* Benth.—; in South America and the West Indies—*J. curcas* Linn., *J. gossypifolia* Linn., *J. multifida* Linn.—; in the Gold Coast—*J. curcas* Linn., *J. gossypifolia* Linn.—; in Guinea, Madagascar, La Reunion—*J. curcas* Linn.—; in South Africa—*J. capensis* Sond., *J. hirsuta* Hoch., *J. zeyheri* Sond.—.

Indians in Natal use the seeds of *J. curcas* Linn. as a purgative.

OFFICIAL :—The flour and the starch from the flour of *J. Manihot* Linn. (*Manihot utilissima* Pohl) in Portugal.

1. **Jatropha glandulifera** Roxb. Fl. Ind. III (1832) 688.—PLATE 866A.

A small evergreen tree containing much clear pale yellow juice; trunk short, stout, dichotomously branched. Leaves 6.3-12.5 cm. long, and as broad as long, palmately 3-5-lobed below the middle, the posterior lobes the smaller; lobes obovate or elliptic, shortly and acutely acuminate, glabrous, the margins serrate, each serrature ending in a gland-tipped bristle, base cordate with a broad but shallow sinus; main nerves numerous, slender; petioles 5-12.5 cm. long, without glandular hairs; stipules very long, divided into many filiform segments, each with a glandular head. Flowers monoecious, greenish yellow, in glandular corymbose cymes; bracts long, lanceolate, acute, with gland-tipped hairs on the margins. Male flowers : Calyx 3 mm. long, divided almost to the base; segments ovate, obtuse. Stamens 8, all united into a column in the lower half, free above. Disk of 5 glands at the base of the staminal column. Corolla 5 mm. long, 5-lobed; lobes 3-4 mm. long, oblong-obovate, rounded, veined. Female flowers : Calyx divided to the base or nearly so; segments 5, ovate, acute. Capsules reaching 1.3 cm. long, ellipsoid-oblong, smooth, 3-lobed. Seeds ellipsoid-oblong, 8 mm. long, smooth and shining, black.

Distribution: Deccan, Botanic Garden, Calcutta.

The root is good for piles.—The leaves have a bad taste; emmenagogue, analgesic; lessen inflammation, asthma, bronchitis,

lumbago; useful in scorpion-sting.—The seeds are purgative; useful in paralysis (Yunani).

The root brayed with water is given to children suffering from abdominal enlargements. It purges, and is said to reduce glandular swellings.

The juice of the plant is used to remove films from the eyes.

The fixed oil from the seeds has purgative properties. It is applied to sinuses, ulcers, foul wounds, ringworm, and also in rheumatism and paralysis.

The leaves are not an antidote to scorpion-venom (Caius and Mhaskar).

Arabic: Abab, Kharub—; *Bengal:* Lalbherenda—; *Bombay:* Janglierandi, Undarbibi—; *Canarese:* Kariturukahalugida, Totlagida—; *Hindi:* Janglierandi, Undarbibi—; *Kolami:* Verendi—; *Konkani:* Ranerandi—; *Malayalam:* Atala, Nakadanti—; *Marathi:* Jangliarandi—; *Persian:* Baide anjira—; *Sanskrit:* Nikumbha—; *Tamil:* Adalai, Eliyamenakku, Erikkaraikattamanaku, Kattamanaku, Puliyamanakku—; *Telugu:* Dundigamu, Dundigapu, Nelaamida, Nelanepalemu, Nepalemu, Nelayamudamu, Vettiyamudamu—; *Urdu:* Jangli eranda—; *Uriya:* Simanorokokalo—.

2. **Jatropha nana** Dalz. in Dalz. & Gibs. Bomb. Fl. (1861) 229.—Plate 867A.

A glabrous undershrub 30-45 cm. high; root woody, as thick as the finger; stem round, smooth, not much branched; branches erect. Leaves large for the size of the plant, 7.5-12.5 cm. long and about as broad as long, broadly ovate, entire or 3-lobed from above the middle, the lobes with entire naked margins, ovate, obtuse or subacute, the middle lobe the largest, base cuneate, with 3 strong nerves from the base; petioles variable in length, 3-25 mm. long; stipules not seen. Flowers pedicellate in few-flowered terminal paniculate cymes; bracts lanceolate, acute, the margins not glandular. Male flowers: Calyx 3 mm. long, glabrous, divided about half way down; lobes ovate, subobtuse. Stamens 8, all united in the lower half; disk of minute glands. Corolla 6 mm. long, glabrous outside; segments almost or wholly free to the base, obovate, cuneate, densely glandular-hairy at the base inside. Female flowers: Calyx 3-4 mm. long,

divided almost to the base, glabrous; segments lanceolate, subacute. Corolla nearly 1 cm. long; petals free, obovate-oblong, glabrous outside, glandular-hairy at the base inside. Ovary glabrous, obovoid, seated on a somewhat saucer-shaped glandular disk. Style 3 mm. long, divided into 3 branches from about the middle, each of the branches again divided at the apex into 2 somewhat triangular lobes about 1.2 mm. long. Capsules 1 cm. long, obovoid-oblong, flattened at the top, slightly 6-lobed.

Distribution: Bombay, Deccan.

The juice is employed as a counter-irritant in ophthalmia.

Marathi: Kirkundi—.

3. **Jatropha multifida** Linn. Sp. Pl. (1753) 1006.—Plate 868.

A handsome garden shrub, easily recognised by its orbicular, long-petioled leaves, 7.5-12.5 cm. diam., palmately cut into narrow caudate segments, capillary multifid stipules, and flat-topped cymes of coral-red flowers. Disk of female urceolate. Capsules subfleshy, large, yellow, 3-lobed.

Distribution: Cultivated everywhere in gardens.—Native of America.

The fruit is pungent and heating; purgative; useful in piles, wounds, enlarged spleen, pains, skin diseases.—The seed is sweetish, oleagenous; purgative, aphrodisiac, fattening, tonic; causes "kapha", "vata", and "pitta", vomiting, and burning sensation (Ayurveda).

The seeds are regarded as a powerful purgative.

In French Guiana, the fresh seeds are used as a purgative and an emetic.

In Cambodia, the leaves, the latex, and the oil from the seeds are used medicinally. The leaves are used in scabies; the latex is applied over wounds and ulcers; and the oil is used both internally and externally as an abortifacient.

Brazil: Flor de Coral—; *Cambodia:* Lohong Khvang Kraham—; *Canarese:* Simeauvdala, Vilayatiharalu—; *English:* Coral Plant, French Physic Nut, Small Physic Nut—; *French:* Medicinier batard, Medicinier d'Espagne, Petit medicinier—; *French Guiana:* Bouquet

corail—; *Ilocano:* Mana—; *Sanskrit:* Bhadradanti, Brihaddanti, Dugdhagarbha Guchhphala, Jayavaha, Jyotishka, Virechani, Vishabhadra—; *Spanish:* Avellana purgante de Santo Domingo, Pinol de Cumana, Purgante de Espana—; *Tagalog:* Mana, Tuba—; *Tamil:* Kattunervalam, Malaiyamanaku—.

4. **Jatropha curcas** Linn. Sp. Pl. (1753) 1006.—Plate 867B.

A large deciduous soft-wooded shrub or small tree, juice sticky opalescent. Leaves alternate, 10-15 by 7.5-12.5 cm., broadly ovate, cordate, acute, usually palmately 3- or 5- lobed, glabrous, base 7-nerved; petiole 7.5-23 cm. long; stipules 0. Flowers 7.5 mm. across, yellowish green in loose axillary cymose panicles 5-12.5 cm. long; peduncles and pedicels more or less tomentose; bracts up to 1 cm. long, linear. Male flowers: Calyx 3.8 mm. long, deeply 5-cleft, lobes elliptic, obtuse, imbricate; corolla one-and-a-half times as long as the calyx, campanulate, villous within, lobes 5; disk of 5 large glands; stamens 10, biseriate, filaments of the inner series connate half way up in a central column, anthers oblong, apiculate, erect; pistillode 0. Female flowers: Calyx 5 mm. long, lobes ovate, acute; corolla scarcely exceeding the calyx; disk as in the male: ovary 3-celled; ovules solitary in each cell, pendulous; styles connate at the base; stigmas large, lanceolate. Fruit 2.5 cm. long, ovoid, black, breaking up into 3 2-valved cocci. Seeds ovoid-oblong, dull brownish black, 1.8 cm. long.

Distribution: Grown in India.—Native of tropical America.

The fruit and the seed are anthelmintic; useful in chronic dysentery, thirst, tridosha, urinary discharges, abdominal complaints, biliousness, anæmia, fistula, diseases of the heart (Ayurveda).

The nuts when roasted are used as a purgative by the Mundas of Chota Nagpur, one nut giving three or four stools. The twigs are used for tooth brushing when the gums are swollen.

The leaves are extensively used in the Cape Verde Islands, in the form of decoction and cataplasm to the mammæ, as a lactagogue.

In West Africa, the sap of the plant is used to cure toothache. It is also used as a styptic, for stopping bleeding. It is said to blind

the eyes. The bark of the roots is ground and used as a dressing for sores.

In Western Ashanti, the leaves are burned and the ashes applied to guinea worms, which are said to come out quickly in consequence.

In the Gold Coast, the leaves are pounded and used with pounded palm nuts to make a mixture which is used as an enema for weak babies to strengthen them. They are also used for smoking bedbugs out of a house. They are often crushed in water and used as an enema. The juice of the leaves is squeezed into water, lemon or lime added, and the liquid used as a bath for curing fever. When the young leaves are boiled, the liquor is drunk to cure fever also. The seeds are commonly used as a very effective purgative. Sometimes they are used in curing eye trouble.

The wood is used in Madagascar and Guiana, as an anti-diarrhœic; the latex is applied to decayed teeth and to wounds, and is used as a styptic; the roots are given as emetic and purgative.

The oil from the seeds is applied topically in Guinea in rheumatism, herpes, and pruritus. The juice of the plant and the pounded leaves are applied to wounds and refractory ulcers.

The juice has been very successfully used by me in the treatment of scabies, eczema and ringworm (B. D. Basu).

The oil from the seeds has been examined chemically (*Agric. Ledger*, 1911; *Journ. Soc. Chem. Ind.*, 1914).

Ada: Kwadidicho—; *Agona:* Kaneadua—; *Akim:* Nkrangye dua—; *Akwapim:* Aborotortor—; *Antilles:* Fĕve d'enfer, Herbe du Bon dieu, Herbe du diable, Mancenillier bénit, Médicinier bénit, Médicinier des Barbades, Noix américaine, Pignon de Barbaric, Pignon d'Inde —; *Antsianaka:* Valavenola, Voanongo—; *Arabic:* Dandebarri, Dandenahri—; *Ashanti:* Akanedua—; *Awuna:* Krorti—; *Bengal:* Bagbherenda, Barendra, Bonbheranda, Erandagachh, Paharierand, Safedind—; *Betsimisaraka:* Kizika—; *Bhil:* Ratan—; *Bombay:* Irundi, Jaiphal, Jepal, Kurikarlu, Maraharalu, Mogalieranda, Yerand—; *Brazil:* Figo do inferno, Mandubiguasu, Munduyguasu, Pinhao do Paraguay, Pinhao de purga, Pinhao paraguay, Pinheiro do inferno, Pinheiro de purga—; *Burma:* Kesugi, Thinbankyekku, Thinbaukyeksu, Thinbawkyetsu—;

Cambodia: Lohong Khvang sa—; *Canarese:* Adaluharalu, Bettadaharalu, Doddaharalu, Dundigu, Kadandla, Kaduharalu, Karnochchi, Maraharalu, Maraharlu, Marayavudula, Parangiharalu, Turukaharalu—; *Chinese:* Ma Fong Chou—; *Deccan:* Ehanduejot, Erundi, Jangliyarandi—; *English:* Barbados Nut, Physic Nut, Poison Nut, Purging Nut—; *Ewe:* Babatsi, Gbomagboti, Krorti—; *Fanti:* Aburokyiriaba, Adadze—; *French:* Grand medicinier, Haricot du Pérou, Manioc bàtard, Medicinier, Oignon d'Inde, Pignon des Barbades, Pignon d'Inde, Grand pignon d'Inde, Pourghere, Purghĕre, Ricin d'Amérique, Gros ricin—; *French Guiana:* Medicinier—; *Fulah:* Kidi—; *Ga:* Kplukacho—; *Gaboon:* Ogomba—; *German:* Purgirnuss, Schwarzelrechnuss—; *Gujerati:* Jamalgota, Jangliarandi, Ratanjota—; *Hasada:* Kulaiaradaru—; *Hausa:* Binidazugu, Chinidazugu—; *Hindi:* Bagberenda, Bagbherenda, Bhernda, Jangliarandi, Paharierand, Safedarand, Safedind—; *Hova:* Tanantanambazaha, Tanantanampotsy, Tanantanankisoa—; *Ilocano:* Tavatova, Tawatawa—; *Kolami:* Kulejera, Totkabendi—; *Konkani:* Erond, Erondd, Jemphal—; *Krepi:* Abrortorto—; *Krobo:* Kitigblaicho, Kutugblaicho—; *Lambadi:* Ranniarendero—; *La Reunion:* Pignon d'Inde—; *Madagascar:* Kinampotsy, Kinanafotsy, Kinapotsy, Kinopotsy—; *Malay:* Jarakblanda—; *Malayalam:* Kattavanakku—; *Marathi:* Mogalieranda, Ranayerandi—; *Mundari:* Jadabindi—; *Naguri:* Kulabindidaru, Totkabindidaru—; *Nepal:* Kadam—; *Nzima:* Taprika—; *Orissa:* Baigab—; *Pahouin:* Ofossntang—; *Persian:* Dandebarri, Dandenahri—; *Philippines:* Bolongcauit, Tuba—; *Portuguese:* Grao maluco, Grao muluco, Pinhao de purga, Purgheira, Ricino maior—; *Quittah:* Abrortorto—; *Sakalave:* Savoa, Valavelo, Voanongo—; *Sanskrit:* Akhuparnika, Chitra, Dravanti, Kananeranda, Mushikaparni, Nyagrodhi, Parvateranda, Pratyakshreni, Randa, Shanbari, Sutashreni, Vrisha—; *Santali:* Bhernda—; *Saora:* Peddanepalemu—; *Sinhalese:* Erandu, Velendaru—; *Soussou:* Barane—; *Spanish:* Arbol de los pinones de Indias, Pinoncillo—; *Tagalog:* Tatataba—; *Tamil:* Adalai, Kadalamanakku, Kaitta, Kattamanakku, Kattukkottai, Kuribaravuni, Naligadi, Nikkurottam, Tiravadi, Vellaiyamanakku—; *Telugu:* Adaviyamudamu, Katiyamudamu, Kondamudamu, Nepalemu,

Peddanepalemu, Pepalemu—; *Tulu:* Kadalambudu—; *Twi:* Aborotortor, Akanedua, Nkangyedua—; *Uriya:* Baigoba, Noroko-kalo—; *Visayan:* Casla—.

5. **Jatropha gossypifolia** Linn. Sp. Pl. (1753) 1006.

A shrub, 0.9-1.8 m., with palmately 3-5-lobed leaves, easily recognised by the stipitate, yellow viscid glands, which cover the leaf margins, petioles and stipules, and by the small red flowers in glandular corymbose cymes. Stamens 10-12.

Distribution: A native of Brazil.—Naturalized in many parts of India.

A decoction of the bark is used as an emmenagogue.

The leaves are applied to boils and carbuncles, eczema and itches.

The seeds act as an emetic; but they are said to cause insanity.

In the pith of the old thick stems a yellowish-brown substance is found which is sold in Gold Coast medicine markets. It is put into a clean cloth and squeezed into the nostrils, causing the patient to sneeze and effectively curing headache.

In the Gold Coast, the leaves and the seeds are used as purgatives. The leaves are boiled and used in the bath to cure fever. Their juice is used to cure sores on the tongues of babies.

Ashanti: Kaagya—; *Canarese:* Kariturukaharalu—; *Ewe:* Babatsi, Gbomagboti—; *Fanti:* Aburokyiraba, Akandedua—; *Ga:* Engmebii, Kpitikpitsho—; *Malayalam:* Simayavanakku—; *Tamil:* Adalai, Kattamanakku, Simaiyamanakku—; *Telugu:* Nepalemu, Simanepalemu—; *Uriya:* Rangakalo—.

ALEURITES Forst.

Trees with simple or stellate pubescence. Leaves alternate, long-petioled, broad, entire or 3-7-lobed, 3-7-nerved from the base, petiole 2-glandular at the top. Flowers in lax terminal panicled cymes, mono- diœ- cious. Male flowers: Calyx subglobose, bursting into 2-3-valvate lobes. Petals 5, longer. Stamens 8-20, on a conical receptacle, 5 outer opposite the petals, alternating with small glands, filaments free; anthers erect, adnate, cells parallel. Pistillode 0.

Female flowers: Perianth of the male. Disk obscure or of glands alternating with the petals. Ovary 2-5-celled; styles with 2 linear stout arms; ovules 1 in each cell. Drupe large; putamen hard, 1-5-celled. Seeds with a thick woody testa, albumen thick hard; embryo straight, cotyledons broad flat.—Species 6.—Warm Asia.

A. cordata Steud. is used medicinally in China; *A. moluccana* Willd. in the Philippine Islands and Brazil; *A. triloba* Forst. in Guiana, and Madagascar.

1. **Aleurites moluccana** Willd. Sp. Pl. IV, 590.—PLATE 869.

Tree about 18 m. tall, stem 38-50 cm. through. Leaves ovate or ovate-lanceolate, 7.5-15 cm. long, 6.3-7.5 cm. wide and larger leaves strongly trilobed, 20 cm. long, 23 cm. wide; petioles 6.3-15 cm. long. Panicles dense, 10 cm. long and a little wider. Flowers very numerous, white scurfy puberulous. Calyx 2.5 mm. long, splitting into 2 or 3 lobes, puberulous. Corolla longer, 1.3 cm. across. Fruit 5-6.3 cm. long, subglobose fleshy olive-coloured, putamen very hard and thick. Seeds 1 or 2.

Distribution: Malay Peninsula.—Malay and Polynesian Islands.

The fruit is sweetish, sour; oleagenous, cooling; aphrodisiac, tonic; improves the appetite; useful in " vata ", diseases of the heart and the blood, burning sensations; increases " kapha " and biliousness; constipating (Ayurveda).

The fruit has a pleasant taste; tonic, aphrodisiac, carminative, expectorant; good for the brain, the heart, the liver, useful in bronchitis, piles, watery eyes, hydrophobia, bruises, ringworm.—The oil is aphrodisiac, cardiotonic; good for pains in the body (Yunani).

The oil obtained from the kernels by expression, has been found in doses from one to two ounces to act as a mild and sure purgative, producing in from three to six hours after ingestion free bilious evacuations. It was found to approach nearly to Castor oil in the mildness and certainty of its operation, but superior to it as having neither taste nor smell, and as producing its cathartic action without any nausea.

The oil has been studied chemically (*Agric. Ledger*, 1907).

Arabic: Jouzebarri, Khasifehindi—; *Bengal:* Akola, Akrot, Jangliakrot—; *Bombay:* Akrod, Jaiphul, Jangliakrot, Janglieranda, Japhal, Jelapa—; *Brazil:* Noz de Bancoul, Noz da India—; *Burma:* Tosikyasi—; *Canarese:* Akroda, Natakrodu—; *China:* Shih Leih—; *Cutch:* Akrota—; *English:* Belgaum Walnut, Bengal Walnut, Candle Nut, Indian Walnut—; *French:* Bancoulier—; *Gujerati:* Akhoda—; *Hawaii:* Eboc, Kukui—; *Hindi:* Akola, Akrot, Jangliakrot—; *Ilocano:* Balucanag—; *Jamaica:* Country Walnut—; *La Reunion:* Bancoul, Bancoulier—; *Malay:* Buahkeras, Kanieri—; *Malayalam:* Akrottu, Akshotam, Karankolam—; *Marathi:* Akhod, Japhala—; *Persian:* Chaharmaghzehindi—; Girdaganehindi—; *Sanskrit:* Akharota, Akhota, Akshota, Asphotaka, Gudashaya, Kandarala, Karparala, Kaureshta, Madanabhaphala, Parvatiya, Phalasneha, Pritakchhada, Rekhaphala, Svadumajja, Vrittaphala—; *Shan:* Kanyin, Mak man yau, Mak yau lik—; *Sinhalese:* Kakkuna—; *Tagalog:* Baguilumban, Balocanad, Balucanad, Calumban, Capili, Lumban, Lumbang—; *Tamil:* Nattakkarottu—; *Telugu:* Natakrotu, Uduga—; *Urdu:* Akharut—; *Uriya:* Akuroto—; *Visayan:* Rumbang—.

BISCHOFIA Bl.

A large tree. Leaves alternate, 3-foliolate; leaflets often crenate. Flowers minute, dioecious, in axillary or lateral paniculate racemes, the males scattered or clustered, with short pedicels, the females with longer pedicels. Male flowers: Sepals 5, concave, obtuse, imbricate, concealing the anthers. Petals 0. Disk 0. Stamens 5; filaments short; anthers large, the cells parallel. Pistillode short, broad. Female flowers: Sepals 5, ovate. Staminodes small or obsolete. Ovary exserted, 3-4-celled; ovules 2 in each cell; styles long, linear, stout, entire, stigmatic throughout on the inner face. Fruit a globose fleshy berry with 3-4 cells lined with a parchment-like 2-valved endocarp. Seeds turgidly oblong; testa crustaceous; albumen fleshy; cotyledons broad, flat; radicle straight, elongate.—Species 1.—Indo-Malaya, Pacific Islands.

1. **Bischofia javanica** Bl. Bijdr. (1826) 1168.

A large evergreen tree, bark dark brown nearly smooth. Leaves alternate, trifoliate; petiole 6.3-15 cm. long, stipules 0.

Leaflets 7.5-12.5 by 3.8-7.5 cm., elliptic or elliptic-oblong, acuminate, crenate, glabrous, rather soft; lateral nerves 6-8 pairs; petiolules of the lateral leaflets 5-10 mm. long, of the terminal 2.5-3.8 cm. long. Flowers minute, dioecious, in axillary or lateral paniculate racemes about as long as the petioles. Male flowers 2.5 mm. diam., rather crowded, pedicels 2.5 mm. long; sepals 5, concave, covering the young stamens, imbricate; petals 0; disk 0; stamens 5; filaments short, anthers large, dehiscing lengthwise; pistillode short, broad. Female flowers 5 mm. diam., not crowded; pedicels rather longer than in the male, elongating in fruit; sepals flat, ovate, acute, not persistent in fruit; petals 0; disk 0; ovary exserted, glabrous, 3-4-celled; ovules 2 in each cell; styles long, linear, entire. Fruit 7.5 mm. diam., brown or black, globose, smooth; seeds 3-4, smooth, shining.

Distribution: Sub-Himalayan forests and outer hills, Chota Nagpur, Assam, Burma, Chittagong, W. Peninsula.—Malay and Pacific Islands.

The juice of the leaves is considered a cure for sores in Assam (Carter).

Assam: Uriam, Uriana—; *Bombay:* Bok—; *Burma:* Aukhyu, Pogaungza, Yepadauk—; *Cagayan:* Toogan—; *Canarese:* Gobranerul, Goparimgurulle, Govarnellu, Nigurulle, Nile, Nilimara *Dehra Dun:* Paniala—; *English:* Java Cedar, Vinegar Wood—; *Garhwal:* Kaen, Karyi, Kotsemla—; *Haldwani:* Pankoen—; *Hindi:* Bhillar, Irum, Kain, Kotsemba, Paniala, Pankain—; *Igorrote:* Tuel—; *Ilocano:* Quitaquita—; *Kadir:* Naunal, Nira, Tirippu—; *Kumaon:* Koen—; *Lepcha:* Sumongkung—; *Malayalam:* Nira, Tirippu—; *Malkot:* Bhillar—; *Mundari:* Daruhajam—; *Nepal:* Kainjal—; *Nilgiris:* Red Cedar—; *Philippines:* Canarem, Dueg, Tua—; *Saora:* Panta—; *Tagalog:* Dampol, Toa, Toob, Tooc, Toog—; *Tamil:* Madagirvembu, Milachadayan, Milachittyan, Tondi—; *Telugu:* Nalupumushti—; *Uriya:* Dingiri—; *Visayan:* Tooc.—.

APOROSA Bl.

Trees. Leaves alternate, quite entire, rerely sinuate-toothed, penninerved. Flowers minute, dioecious, rarely monoecious, apetalous,

males most minute in axillary catkin-like spikes; female sessile or shortly pedicelled in very short bracteate spikes. Male flowers : Sepals 4 (3-6), membranous, imbricate. Stamens 1-5 in the centre of the flower, filaments capillary; anthers didymous. Pistillode minute or 0. Female flowers : Sepals of the male, but larger. Ovary 2- (rarely 3-) celled; stigmas small, plumose, short, spreading or recurved, simple or 2-4-cleft, rarely elongate and 2-partite; ovules 2 in each cell. Fruit globose, ellipsoid or ovoid, bursting irregularly, or partially 2-4-valved from the base upwards, epicarp thin or thick and spongy or fleshy, endocarp thin, often separable; cells glabrous or hairy within, especially on the septum. Seeds oblong or suborbicular, usually plano-convex, albumen fleshy; cotyledons broad, flat.—Species 35.—Indo-Malaya.

The genus is therapeutically inert.

1. **Aporosa lindleyana** Baill. Etud. Gen. Euphorb. (1858) 645; Bedd. Fl. Sylv. t. 286.—*Scepe Lindleyana* Wight Ic. t. 361.

A small or middle-sized tree; bark thin, smooth. Leaves thinly coriaceous, 9-16.5 by 3.5-5.6 cm., elliptic-oblong, acuminate, glabrous, base acute or rounded; main nerves 8-10 pairs, slender; petioles 8-13 mm. long; stipules lanceolate, acute, soon falling. Male flowers sessile; spikes 2.5-3.8 cm. long, dense. Sepals usually 4, ovate-oblong, obtuse, 1.3 mm. long, ciliate. Stamens 2-3; filaments 1.6 mm. long; anthers subglobose. Female flowers in very short, hairy, often clustered racemes; pedicels short. Sepals ovate, subacute, 1.6 mm. long. Ovary flask-shaped, shortly pedicellate, hairy; style short, with 3 large laciniate curved stigmas 1.3 mm. long. Fruit 1 cm. or slightly more in diam., quite globose, pointed with the style. Seeds plano-convex, broadly ovate, subacute, 6 mm. long and as broad as long.

Distribution: W. Peninsula, Ceylon.

A decoction of the root is given in jaundice, fever, headache, insanity, and seminal loss.

Canarese: Sarali—; *Malayalam:* Kotili, Vetti, Vittil—; *Sinhalese:* Barawaembilla, Kebella—; *Tamil:* Kotili, Vittil—; *Tulu:* Sarali—.

CROTON Linn.

Trees or shrubs (rarely herbs). Leaves usually alternate, usually 2-glandular at the base. Flowers monoecious (in the Indian species), solitary or clustered on the rhachis of a terminal raceme; bracts small. Male flowers: Calyx 5- (rarely 4-6-) partite; segments imbricate or subvalvate. Petals 5 (rarely 4-6), never exceeding but sometimes shorter than the calyx. Disk of 4-6 glands opposite the sepals. Stamens many, inserted on a hairy receptacle; filaments free, inflexed in bud, at length straight; anthers adnate, with parallel cells. Pistillode 0. Female flowers: Sepals usually more ovate than in the male, rarely accrescent in fruit. Petals smaller than the sepals or obsolete. Disk annular, or of 4-6 glands opposite the sepals. Ovary 3- (rarely 2-4-) celled; ovule solitary in each cell; style usually long and slender, 2-4-cleft. Capsule sub-equally 6-valved, or of 3 separating 2-valved cocci. Seeds smooth; caruncle small; testa crustaceous; albumen copious; cotyledons broad. —Species 600.—Tropics and subtropics.

1. Leaves densely lepidote beneath .... 1. *C. reticulatus.*
2. Leaves glabrous when old .... 2. *C. oblongifolius.*
3. Leaves 3-5-plinerved at the base, scabrid or softly pubescent with stellate hairs beneath .... 3. *C. caudatus.*
4. Leaves strongly triple-nerved .... 4. *C. tiglium.*

The genus exhibits various well-marked medicinal properties: bitter, tonic, and stimulant; vulnerary and astringent; diuretic and cathartic; antisyphilitic.

The following species are used medicinally in China, Indo China, Malaya, the Philippine Islands—*C. tiglium* Linn.—; in Cambodia—*C. tiglium* Linn., *C. oblongifolius* Roxb.—; in Mexico— *C. dioicum* Cav., *C. draco* Cham. and Schlech., *C. niveus* Jacq., *C. vulpinus* Sesse and Moq.—; in Venezuela and Colombia—*C. malambo* Karst.—; in Peru—*C. suberosum* H. B. K.—; in Brazil—*C. anti-syphiliticus* Mart., *C. campestris* St. Hil., *C. fulvus* Mart.—; in Guiana—*C. origanifolius* Lam.—; in the West Indies—*C. cascarilla* Bennett, *C. eluteria* Bennett, *C. flavens* Linn., *C. glabellus* Linn., *C. lucidus* Linn.—; in the Gold Coast—*C. lobatus* Linn.—; in East Africa—*C. elliotianus* Baill., *C. gubouga* S. Moore—;

in Southern Africa—*C. gratissimus* Burch., *C. gubouga* S. Moore, *C. sylvaticus* Hochst.—; in Madagascar—*C. macrobuxus* Baillon—.

Official :—The bark of *C. Eluteria* Bennet (Italy, Sweden),—L. Bennet (Russia),—(L.) Bennet (Switzerland),—Bennett (Austria, Denmark, Holland, Japan, Norway),—Bennett non Swartz (Portugal), —J. J. Benn. (Great Britain).

The seeds of *C. Tiglium* Linn=*Tiglium officinale* Klotzsch (Portugal).

The oil from the seeds of *C. Tiglium* Linn. in Austria, Belgium, Denmark, France, Germany, Great Britain, Japan, Norway, Russia, Spain, Switzerland, United States.

1. **Croton reticulatus** Heyne in Wall. Cat. (1828) 7724B. —Plate 870.

A shrub or small tree; branchlets, petioles, and rhachis covered with ferruginous easily detachable scales. Leaves 6.3-15 by 2.5-5 cm., elliptic-lanceolate, acute or acuminate, entire, glabrous above, clothed beneath with silvery scales, base acute or rounded, furnished with a pair of stipitate glands; petioles 6-32 mm. long; stipules subulate. Flowers pedicellate, clothed with silvery scales, in terminal racemes shorter than the leaves, the females few at the base of the raceme. Male flowers : Buds globose. Pedicels 1.5-4 mm. long, slender. Sepals 2.5 mm. long, ovate-oblong, obtuse, ciliolate. Petals slightly shorter than the sepals, obovate, obtuse. Stamens 14-20, inserted on a hairy receptacle. Female flowers: Pedicels stout, 2.5 mm. long. Calyx 4-6 mm. long; sepals oblong-lanceolate, much enlarged in fruit. Ovary with reddish brown scales and stellate hairs. Style about 6 mm. long, 3-branched shortly above the base, each branch again 2-branched and again divided into 2 long linear lobes at the apex. Capsules ovoid-oblong, under 1.3 cm. long, slightly 3-lobed, apiculate, with reddish brown stellate hairs mixed with scales. Seeds purplish brown mottled with white.

Distribution: W. Peninsula, Ceylon.

The bark is used as a bitter stomachic.

Bombay: Panduray—; *Marathi:* Pandhari, Pandharisala—.

2. **Croton oblongifolius** Roxb. Fl. Ind. III (1832) 685.—PLATE 871.

A middle sized tree; young shoots, branchlets, inflorescence, calyx, and ovary clothed with minute orbicular silvery scales. Leaves 12.5-25 by 5.7-11.5 cm., crowded towards the ends of the branchlets, oblong-lanceolate, subacute, glabrous when fully grown, more or less crenate or serrate, penninerved, base usually acute with no apparent glands above the petioles; main nerves numerous, slender; petioles 2-3.2 cm. long. Flowers pale yellowish green, solitary or fascicled in the axils of minute bracts on long erect often fascicled racemes, the males in the upper part of the raceme, the females in the lower part. Male flowers: Pedicels variable in length, reaching 4 mm. long, slender. Calyx more than 6 mm. across when flattened out, divided about 3/4 the way down; segments more than 2.5 mm. long, ovate, obtuse. Petals 3 mm. long, elliptic-lanceolate, obtuse, woolly. Stamens 12, inflexed in bud; filaments 3 mm. long, the lower half hairy. Female flowers: Pedicels short, stout. Sepals more acute than in the male with densely ciliate margins. Petals 2 mm. long, obovate, with densely woolly margins. Styles 3, nearly 4 mm. long, each again subdivided into 2 long slender curled branches 3 mm. long. Capsules less than 1.3 cm. diam., subglobose, a little depressed, slightly 3-lobed, clothed with small orbicular scales. Seeds 8 by 6 mm., ellipsoid, rounded and quite smooth on the back.

Distribution: Sylhet, Bengal, Chota Nagpur, Central Provinces, Burma, W. Peninsula, Ceylon.

The seeds and fruits are purgative.

The Goanese and the inhabitants of Southern Konkan administer the bark in chronic enlargements of the liver and in remittent fever. In the former disease, it is both taken internally and applied locally. As an application to sprains, bruises, rheumatic swellings, etc., it is in great request.

In the Southern Konkan, it has a reputation as a remedy in snake-bites.

The Santals use the bark and root as a purgative and as an alterative in dysentery (Campbell).

The roots enter into the composition of pills used by the Mundas of Chota Nagpur for chronic rheumatism. The root bark is given in small doses as a purge; a larger quantity is poisonous.

The leaves are used externally in Cambodia, for liver complaints and scabies.

The root, bark, and seeds are equally useless in the antidotal and symptomatic treatment of snake-bite; the root is useless as an external application (Mhaskar and Caius).

Assam: Burmaparokupi—; *Bengal:* Baragach—; *Bombay:* Ganasur, Gunsur—; *Burma:* Theyin, Thityin—; *Cambodia:* Trapung—; *Goa:* Gonsur—; *Kolami:* Konya, Kuli, Kurti, Poter—; *Lohardugga:* Putri—; *Malay:* Kote, Putol—; *Marathi:* Ganasura, Gunsur—; *Mundari:* Kuti—; *Nepal:* Ach—; *Oudh:* Arjunna—; *Patna:* Chucka—; *Sanskrit:* Bhutankusa—; *Santali:* Gote—; *Tamil:* Milgunari—; *Telugu:* Bhutalabhairi, Bhutankusamu—.

3. **Croton caudatus** Geisel Croton. Monogr. 73.—PLATE 872A.

A large scandent shrub, the younger parts scurfy-strigose from stellate bristly hairs. Leaves from oval and ovate to oblong-ovate, cordate rounded or almost truncate at the stipitately 2-glanded base, on a stellately rough petiole 1.3-2.5 cm. long, shortly and rather abruptly acuminate, rigidly membranous, 5-7.5 cm. long, more or less crenate-serrate, and often furnished with stalked glands in the crenatures, rough on both sides, while young densely stellate-hispid beneath, finally only sprinkled with tubercled-stellate, minute, stiff hairs, the transverse net-venation prominent. Flowers small, dull yellowish green, the females shortly and thick-pedicelled, the males on rather slender stellate-pubescent pedicels up to 4 mm. long, solitary or by 2 or 3 to each bract, and forming rather long stellate-pubescent racemes at the end of the branchlets; calyx greyish stellate-pubescent outside, glabrous or nearly so within; petals of the males rather shorter than the sepals, woolly along the margins; filaments long white-pilose at the base; female calyx a little enlarging, the sepals almost 3-ribbed; ovary densely tawny-stellate-hispid, the styles deeply 2-cleft. Capsules large, woody, the size of a bullet or pigeon's egg, obscurely 3-cornered, 3-coccous, covered with a pale

tawny, minutely stellate, somewhat scurfy, rough tomentum. Seeds more than 8 mm. long, transversely and obscurely furrowed on the flattened back, smooth and glossy.

Distribution: E. Himalaya, Assam, Bengal to the Deccan and Malacca, Ceylon.—Java, Philippines.

The leaves are applied as a poultice to sprains (Home).

In Lakhimpur, the young leaf buds are powdered up with the leaves of *Caesalpinia sappan* and used for liver diseases (Carter).

Bengal: Nanbhantur—; *Lakhimpur:* Latamahndi—; *Lepcha:* Takchabrik, Talikkorik—; *Malay:* Akar guroh periat, Akar tuku takal—; *Nepal:* Halongre, Supari—; *Uriya:* Pholancokriti, Sanaushnota, Wusta—.

4. **Croton tiglium** Linn. Sp. Pl. (1753) 1004.—Plate 872B.

An evergreen tree, the young shoots sprinkled with stellate hairs; bark smooth, ash-coloured. Leaves oblong to ovate-lanceolate, on a slender glabrous petiole 2.5-5 cm. long, obtuse or rounded at the 2-glanded base, 5-10 cm. long, minutely and remotely repand-toothed, acuminate, membranous, yellowish green, adult glabrous. Flowers small, the males on slender glabrous pedicels, solitary or by 2 or 3, the females larger, on short, thick, densely stellate-pubescent pedicels about 2-3 mm. long, solitary, both sexes forming terminal glabrous or almost glabrous racemes at the end of the branchlets; male calyx glabrous or nearly so, the female sprinkled with stellate hairs; petals of males white, villous; filaments 15-20, woolly at the base; ovary tawny-stellate-tomentose. Capsules oblong and obtusely 3-lobed, 3-coccous, 17 to nearly 25 mm. long, almost glabrous. Seeds smooth, about 13 mm. long or longer, purgative.

Distribution: Bengal, Assam to Malacca, Burma, Ceylon. Naturalized or cultivated.—China, Malay Islands.

The fruit and the seed are purgative.—The oil from the seed is purgative, carminative; useful in diseases of the abdomen, mental troubles, convulsions, fever, insanity, inflammations, bronchitis (Ayurveda).

The seeds have a bitter bad taste, causing a burning sensation; cathartic, expectorant, emetic; good in sore eyes, excessive phlegm,

leucoderma.—The oil is cathartic, tonic; removes pus and bad matter from the body (Yunani).

The seeds and the oil are officinal and their properties are well known: irritant, rubefacient, cathartic.

In Lakhimpur, the seeds are ground in water, and the infusion is used to kill insect pests (Carter).

The fruits are employed by Dayaks in Borneo to poison fish. The root is used in Kelantan as an abortifacient.

On account of their drastic purgative properties the seeds and oil are regarded by the Chinese as entirely poisonous. The bark is used as a tonic in Annam.

Croton oil is quite ineffective as an anthelmintic. The seeds are useless as an external application to the sting of the scorpion (Caius and Mhaskar).

The seeds are not an antidote to snake-venom, and they are useless as a collyrium in the treatment of snake-bite. The leaves are equally useless as an external application (Mhaskar and Caius).

Annam: Ba dau—; *Arabic:* Batu, Dand, Datun, Habbussalatin—; *Bengal:* Jaypal—; *Bombay:* Jaipa, Jamalgota—; *Burma:* Kanako—; *Canarese:* Danti, Japala, Nepala—; *Chinese:* Pa Teou, Pa Tou—; *English:* Purging Croton—; *French:* Bois des molusques, Bois de Pavana, Bois de Pavanna, Bois purgatif, Petit pignon d'Inde—; *Gujerati:* Nepal—; *Hindi:* Jamalgota—; *Italian:* Grana tiglio—; *Java:* Cheraken—; *Lakhimpur:* Kanibhi—; *Malay:* Chemkian, Chengkian—; *Malaya:* Bori, Pai tow—; *Malayalam:* Dantibijam, Katalavanakku, Nrvalam, Nirvalam—; *Marathi:* Jamalagota, Jepal, Jeyapal—; *Nepal:* Lapchebis—; *Persian:* Bedanjirekhatai, Bidendjirehkhatai, Dund, Habbekhatai—; *Portuguese:* Croton tiglio—; *Sanskrit:* Danti, Jayapala, Nepala—; *Sinhalese:* Jayapala—; *Tagalog:* Camaisa, Tuba, Tubacamaisa—; *Tamil:* Kattukkattai, Naganam, Nagandi, Nervalam, Nigumbam, Nirvalam, Sambari, Sayabalam, Sevalangottai, Siduram, Sittudu, Tendi—; *Telugu:* Nepalamu, Nepalavemu—; *Tulu:* Berada, Byaribittu—; *Uriya:* Jaipalo, Joyopalo, Konika—; *Visayan:* Camarandag, Macasla, Tubasabuquid—.

CHROZOPHORA Neck.

Diffuse densely hispid or stellately tomentose herbs. Leaves alternate, sinuate-toothed or lobed, wavy or plicate, 2-glandular at the base. Flowers monoecious, in axillary bracteate racemes, the males crowded in the upper part of the raceme, the females solitary, pedicellate, in the lower part. Male flowers: Calyx globose or ovoid, splitting into 5 valvate segments. Petals 5, short. Disk obscure. Stamens 5-15; filaments connate below in a column in 1-3 series; anthers oblong, the cells parallel, contiguous. Pistillode 0. Female flowers: Sepals 5, narrow. Petals 5, very narrow, sometimes setaceous or obsolete. Disk of 5 short broad glands alternating with the petals. Ovary 3-celled; ovule solitary in each cell; styles erect or spreading, 2-fid. Capsule of 3 hispid, tomentose or lepidote, 2-valved, almost fleshy cocci. Seeds estrophiolate; testa shining; albumen fleshy; cotyledons broad, flat.—Species 11.—Mediterranean, Asiatic and African.

1. Ovary and capsule with stellate tomentum and silvery scales
   A prostrate herb. Stamens 15 in 2 whorls .... 1. *C. rottleri.*
2. Ovary and capsule with stellate tomentum but without silvery scales
   A procumbent stellately woolly herb .... 2. *C. prostrata.*

C. rottleri A. Juss. is used medicinally in Europe.

1. **Chrozophora rottleri** A. Juss. ex Spreng. Syst. Veg. III (1826) 850.—*C. tinctoria* Hook. f. Fl. Brit. Ind. V (1887) 408 (partim); Cooke Fl. Bomb. Pres. II (1906) 606 (nan A. Juss).—PLATE 873C (under *C. tinctoria*).

An annual prostrate herb, the whole plant densely clothed with stellate tomentum; stems about 30 cm. long, branched, not stout. Leaves thick, softly stellately tomentose on both surfaces, 3.2-7 by 3.2-6.3 cm., from ovate and sinuate-toothed or entire to rounded and obtusely lobed; petioles 1.3-6.3 cm. long. Flowers in short racemes lengthening in fruit, the males numerous, crowded and sessile at the top of the raceme, the females pedicellate in the lower part, solitary; bracts narrowly linear, 1.6-2 mm. long, hairy. Male flowers: Calyx 3-4 mm. long, densely stellately tomentose. Petals 5, thin,

membranous, elliptic-lanceolate, 2.5 mm. long. Stamens about 15 in 2 whorls. Female flowers: Pedicels often elongating in fruit. Calyx divided almost to the base, densely stellately tomentose; sepals 5, triangular, acute, 2.5 mm. long by 0.8 mm. wide at the base. Petals like the sepals but narrower and shorter, densely stellately tomentose. Ovary stellately tomentose and clothed with silvery scales; styles 3, each deeply 2-fid, usually spreading. Capsules 6-10 mm. diam., clothed with stellate tomentum and silvery scales. Seeds 4 mm. long, shining with a silvery sheen, slightly tuberculate.

Distribution: S., W., Central and N. India, Indo-China.

The plant has emetic, drastic, and corrosive properties. The seeds are used as a cathartic in Europe.

The plant yields the colouring matter which is used under the name of litmus in chemical analysis.

Afghanistan: Kapochist—; *English:* Turnsole—; *French:* Morelle ă indigo—; *Gujerati:* Kalookharad—; *Hindi:* Shadevi, Sonballi, Subali—; *Marathi:* Suravarta—; *Punjab:* Kukronda, Nilan, Tappalbuti—; *Sanskrit:* Suryavarta—; *Sind:* Shadevi, Sonballi, Subali—; *Spanish:* Tornasol—.

2. **Chrozophora prostrata** Dalz. in Dalz. & Gibs. Bomb. Fl. (1861) 233; Cooke Fl. Bomb. Pres. II (1906) 607 (Africa excluded); Prain in Kew Bull. (1918) 90.—*C. plicata* var. *genuina* Muell.-Arg. in DC. Prodr. XV, 2 (1866) 747 (quoad spec. Ind. tantum, excl. syn.).—*C. plicata* var. *prostrata* Muell.-Arg. l. c. (syn. Dalz. et Klotzsch tantum).—*C. plicata* 3 Hook. f. Fl. Brit. Ind. V (1887) 409.—Plate 873A (under *C. plicata*).

A procumbent humifuse stellately woolly herb; branches numerous, spreading from the root, woolly-tomentose. Leaves 1.2-3.2 cm. diam., broadly ovate or orbicular, dark coloured, deeply bullate, finely pubescent and with some stellate hairs above, densely stellately woolly beneath, base cordate or truncate. Flowers in short few-flowered axillary racemes; bracts linear, 3-4 mm. long. Male flowers: Calyx 3 mm. long. Petals elliptic-lanceolate, rather more

than 2.5 mm. long. Stamens 15 in 2 whorls. Female flowers: Sepals 2.5 by 0.4 mm., linear, acute. Petals linear, as the sepals but smaller and narrower. Styles 2.5 mm. long, slightly connate at the base, 2-fid to more than half way down. Capsules 6 mm. diam., stellately woolly without silvery scales.

Distribution: Punjab, Upper Gangetic Plain, Bihar, Gujarat, Konkan, Deccan, N. Kanara, Sind, Central and S. India.

The ashes of the root are given to children for cough. The leaves are considered depurative. The seeds are used as purgative (Stewart).

The Santals mix the root with that of *Carissa Carandas* for blistering purposes (Campbell).

Bengal: Khudiokra—; *Gujerati:* Betookharada, Okharada—; *Hindi:* Shadevi, Sonballi, Subali—; *Punjab:* Nilakrai, Nilkhanti, Putkanda—; *Sanskrit:* Suryavarta—; *Santal:* Pangonari—; *Sind:* Shadevi, Sonballi, Subali—; *Tank:* Nealboti—; *Telugu:* Guruguchettu, Lingamiriyam—.

ACALYPHA Linn.

Herbs shrubs or trees. Leaves alternate, toothed or crenate (rarely entire), penninerved or 3-5-nerved. Flowers usually monoecious, minute, in axillary or terminal racemes, or the females 1-2 in a pedunculate solitary bract, or casually dioecious; males very minute, ebracteate; females often at the base of large accrescent leafy bracts, low on the male spike or in separate spikes. Perianth simple. Male flowers: Sepals 4, valvate. Petals 0. Disk 0. Stamens usually 8, sometimes many on a convex receptacle; filaments short, free; anther-cells distinct, divaricate, often at length twisted or flexuous. Pistillode 0. Female flowers: Sepals 3-4, minute, imbricate. Petals 0. Disk 0. Ovary 3-celled; ovule solitary in each cell; styles filiform, often very long and laciniate or fimbriate. Capsules of 3 minute 2-valved crustaceous cocci. Seeds subglobose; testa crustaceous; albumen fleshy; cotyledons broad, flat.—Species 320.—Tropical and subtropical.

1. Leaves ovate-acute or subacute, crenate, glabrous and glandular beneath	1.	*A. fruticosa.*
2. Leaves long-petioled, ovate or rhombic-ovate, crenate-serrate ..	2	*A. indica.*
3. Leaves broadly rhombic-ovate, at the base shortly cuneate, at the apex cuspidate-acuminate, subacutely and coarsely serrate	3.	*A. hispida.*
4. Leaves long-petioled, ovate-acuminate	4.	*A. paniculata.*

The root is cathartic; the leaves are laxative and vulnerary.

The following species are used medicinally in the Philippine Islands—*A. indica* Linn.—; in Madagascar—*A. spiciflora* Burm. f.—; in La Reunion—*A. indica* Linn., *A. integrifolia* Willd.—; in Zululand —*A. peduncularis* Meissn., *A. punctata* Meissn.—; in Southern Rhodesia—*A. petiolaris* Hochst.—; in the Gold Coast—*A. ciliata* Forsk.—.

1. **Acalypha fruticosa** Forsk. Fl. Aegypt. Arab. 161.—Plate 873B.

A leaf-shedding branched shrub, 1.2-2.4 m. high, all softer parts greyish puberulous. Leaves ovate-oblong to ovate, more or less rounded or acute and 3- or almost 5- nerved at the base, on a slender glabrescent petiole 1.3-2.5 cm. long, acuminate to acute or rarely blunt while young, 2.5-5 cm. long, membranous, roughish above, softly puberulous beneath. Flowers minute, greenish, clustered, sessile, forming slender, puberulous, sessile spikes arising singly or by 2-3 from above the scars of the fallen leaves, the females at the very base of the spike or in separate small cluster-like few-flowered spikes in the axils of the young leaves; bracts of both sexes rotundate and toothed while in bud, turning broadly ovate, acute, concave, minutely greyish pubescent outside; ovary appressed greyish pubescent, the styles simple, many-cleft, about 2-3 times longer than the floral bracts.

Distribution: Deccan Peninsula, Ceylon, Pegu, Martaban and Ava.—Arabia, tropical Africa.

The leaves are attenuant and alterative, and an agreeable stomachic in dyspepsia and other ailments. The dose of the infusion of the leaves as ordered by the Vaidyas in Southern India is half a teacupful twice in the day (Ainslie).

Canarese: Chinni—; *Deccan:* Chinni—; *Tamil:* Sinni—; *Telugu:* Chinni—.

2. **Acalypha indica** Linn. Sp. Pl. (1753) 1003; Wight Ic. t. 877.—PLATE 874.

Annual erect herb 30-75 cm. high; branches numerous, long, ascending, angular, finely pubescent. Leaves 2.5-7.5 by 2-4.5 cm., ovate or rhomboid-ovate, acute or subobtuse, crenate-serrate, glabrous, thin, base cuneate, somewhat 3-nerved; petioles usually longer than the blade, slender; stipules minute. Flowers in numerous lax erect, elongate axillary spikes, the males minute, clustered near the summit of the spike, the females scattered, 3-5 surrounded by a shortly pedunculate large leafy truncate dentate cuneiform many-nerved bract 6-8 mm. diam. Ovary hispid. Capsules small, hispid, quite concealed by the bract, often only 1-seeded. Seeds ovoid, smooth, pale brown, 1.2 mm. long.

Distribution: Throughout the hotter parts of India, Ceylon.—Tropical Africa, Philippines.

The plant is used as expectorant as a substitute for senega. It has also a diuretic action. It is a useful remedy for bronchitis, asthma and pneumonia; also for rheumatism. It was formerly employed as a purgative and anthelmintic.

The root, bruised in hot water, is employed as a cathartic, and the leaves as a laxative in decoction mixed with common salt. The leaves are used in scabies, and mixed with chunam in other cutaneous diseases (Drury).

The powder of the dry leaves is given to children in worm cases, also a decoction prepared from the leaves with the addition of a little garlic. The juice of the same part of the plant, together with that of the tender shoots, is occasionally mixed with a small portion of margosa oil, and rubbed on the tongues of infants for the purpose of sickening them and clearing their stomachs of viscid phlegm.

The expressed juice of the leaves is in great repute, wherever the plant grows, as an emetic for children, and is safe, certain and speedy in its action. Like Ipecacuanha, it seems to have little tendency to act on the bowels or to depress the vital powers, and it decidedly increases the secretion of the pulmonary organs.

A decoction of the leaves is given in earache; a cataplasm of the leaves is applied as a local application to syphilitic ulcers, and

as a means of relieving the pain of snake-bite and the irritation caused by the bite of the centipede.

Fresh leaves ground into a paste, made into a ball to the size of a large marble, and introduced into the rectum, are very useful in relieving obstinate constipation of children.

The plant is used in congestive headaches : a piece of cotton is saturated with the expressed juice and inserted into each nostril, relieving head symptoms by causing hæmorrhage from the nose. The powder of the dry leaves is used in bed sores and wounds attacked by worms.

The leaf of this plant is said to be an antiparasiticide and is applied externally ground with common salt or quicklime or lime juice. A paste of the leaves with lime juice was prescribed for cases of ringworm (different varieties of cutaneous tænea). In chronic cases it had no effect, but in recent cases it did some good (Koman).

The plant is quite ineffective as an anthelmintic (Caius and Mhaskar).

The leaves are useless as an external application in snake-bite (Mhaskar and Caius).

Bengal: Muktajari, Murkanta, Shwetbusunta—; *Bombay:* Khokali, Khokli, Kuppi—; *Canarese:* Chalmari, Kuppi—; *Chinese:* T'ie Han Ts'ai—; *Ceylon:* Kuppameni, Punairananki—; *French:* Bois gueue de rat—; *Godavari:* Murkandachettu, Murukonda—; *Gujerati:* Vanchhikanto—; *Hindi:* Khokali, Khokla, Khokli, Kuppi—; *Malay:* Rumput lislis—; *Malayalam:* Kuppamani—; *Marathi:* Khajoti, Khokla, Khokli, Kupi— ; *Porebunder:* Dadro—; *Sanskrit:* Arittamunjariye—; *Sinhalese:* Kupamenya, Kuppamaniya—; *Tamil:* Kuppaimeni, Kuppamani—; *Telugu:* Kuppaichettu, Kuppintaku, Murkandachettu—; *Uriya:* Indramaris—.

3. **Acalypha hispida** Burm. Fl. Ind. (1768) 303, t. 61, f. 1 (non Willd. *nec* Blume).—Plate 875A.

A shortly tomentose plant. Petioles 3-5 cm. long. Blade of leaves 10-15 cm. long, 7-11 cm. broad, broadly rhombic-ovate, at the

base shortly cuneate, at the apex cuspidate-acuminate, subacutely and coarsely serrate, rigidly membranous. Flowers diœcious. Spikes unisexual, the female ones flower-bearing almost from the base, finally reaching 25 cm., longer than the leaves, erect-patent, almost dense-flowered; styles exserted, purple, very long; female bracts 5-8-flowered, minute, entire, resembling in shape and size the segments of the female calyx, ovate-lanceolate. Sepals 3-4, triangular-ovate, acute, ciliate. Male spikes pendulous. Ovary densely silky, hispid.

Distribution: Cultivated in Indian gardens.—Origin not known.

The flowers are said to be specific in diarrhœa and similar disorders; boiled in water or administered in the form of a conserve (Lindley). Its leaves are beaten up with green tobacco leaf and infusion of rice and applied to inveterate ulcers (Rheede).

Malayalam: Vattattali—.

4. **Acalypha paniculata** Miq. Fl. Ind. Bat. I, II, 406.—Rheede Hort. Mal. X, t. 83.

A small shrub, much-branched; branches virgate, divaricate, ascending; young parts pubescent. Leaves numerous, alternate, 3.27.5 cm., ovate or oblong-ovate, rounded at base, acuminate, acute, strongly serrate, sparsely hairy on both surfaces, thin; petiole various, often as long or longer than leaves, spreading or deflexed, slender, pubescent; stipules minute, subulate. Flowers minute, monoecious; male sessile in small clusters on very slender, rather dense flowered, ascending, axillary spikes; female shortly pedicelled, on branches of large, erect, very lax, slender, terminal panicles; bracts minute, inconspicuous. Male flowers: Stamens 8. Female flowers : Sepals 5, linear, very acute, glandular-hairy. Styles long, erect, with many filiform, twisted branches. Capsule very small, 3-lobed, strongly glandular-hairy.

Distribution: S. India, Ceylon, Java, tropical Africa.

It is used as a substitute for *A. indica.*

TREWIA Linn.

Soft-wooded trees. Leaves opposite, broadly ovate or orbicular, entire; base cordate, 3-5-nerved. Flowers dioecious, rather large, developed before the leaves, the males in lax lateral bracteate racemes one to each bract, the females long-pedunculate, solitary or racemose. Perianth simple. Petals 0. Disk 0. Male flowers: Calyx globose, splitting into 3-4 broad concave often reflexed segments. Stamens numerous, on a convex receptacle; filaments free; anthers dorsifixed, oblong, the cells parallel, contiguous. Pistillode 0. Female flowers: Sepals 3-5, broad, imbricate, caducous. Ovary 2-4-celled; ovule solitary in each cell; styles connate below, long, terete, entire, papillose throughout. Fruit 2-4-celled, indehiscent or dehiscing loculicidally; pericarp more or less fleshy; endocarp crustaceous. Seeds rounded on the back with flat or angular faces, smooth; testa hard; albumen fleshy; cotyledons broad, flat.—Species 2.—Indo-Malaya.

The genus has detergent and demulcent properties.

1. **Trewia nudiflora** Linn. Sp. Pl. (1753) 1193 (*Trevia*).—PLATE 876.

A large deciduous tree, bark smooth, pale grey, young shoots, leaves and inflorescence clothed with caducous grey tomentum. Leaves opposite, 15-23 by 11.5-18 cm., ovate, entire, acuminate, base usually cordate, 3- or 5- nerved, glabrous when mature, glandular at the base near the top of the petiole; petiole 5-10 cm. long; stipules minute, acute, caducous. Flowers dioecious, petals 0, disk 0. Male flowers yellow, 7.5 mm. across, arranged in bracteate 1-4-flowered fascicles on the rhachis of a lax drooping receme 10-23 cm. long; racemes appearing before the leaves from naked buds or in the axils of the young leaves; pedicels 2.5-5 mm. long, slender, jointed; sepals 3-5, concave, valvate, ultimately reflexed, 3.8-5 mm. long, pubescent; stamens numerous, free, on a convex torus, anthers erect, dehiscing longitudinally; pistillode 0. Female flowers green, solitary or 2-3 together, common axillary peduncles about 2.5 cm. long; calyx 7.5-10 mm. long, flask-shaped, shortly 3-5-toothed, densely grey-villous, closely surrounding the ovary,

ultimately splitting down one side and dropping off; ovary 2-5-celled, villous, hidden by the calyx; ovules 1 in each cell; styles as many as ovary-cells, shortly connate below, 1.3-1.8 cm. long, entire, conspicuously papillose. Fruit drupaceous, 2.5-3.8 cm. diam., depressed-globose, green, pericarp rather firm somewhat succulent, stone 2-5-celled.

Distribution: Throughout the hotter parts of India, Ceylon, Malay Peninsula.—Sumatra, Java.

The plant is cooling, tonic, alexiteric; improves taste; removes biliousness (Ayurveda).

The plant is used for the removal of swelling, bile, and phlegm. The root in decoction is given to relieve flatulence, and is applied locally in gouty or rheumatic affections.

Bengal: Pitali—; *Bombay:* Bhillauri, Petari, Tumri—; *Burma:* Setkadon, Thitmyoke, Yehhmyot, Yemyot—; *Canarese:* Kadukanji, Kadukere, Kadukumbala, Kanji, Katkumbala, Katkumbla, Padye, Shillauri, Tumri—; *Dehra Dun:* Gamhar, Tumri—; *Haldwani:* Gutel—; *Hindi:* Bhillaura, Gamhar, Khamara, Pindara, Tumri—; *Kolami:* Garalohadaru—; *Kumaon:* Khamara, Tumri—; *Lepcha:* Tungplam—; *Magahi:* Hruprukban—; *Malayalam:* Kanji, Kattukumil, Malankumil, Pamarakkumil, Pambarakumbil—; *Marathi:* Petari, Pitari—; *Monghyr:* Gamhar—; *Mundari:* Garalupung—; *Nepal:* Aulekapasi, Gamari, Garum, Kurong, Ramritha—; *Oudh:* Bhillaur, Bhillaura—; *Saharanpur:* Dhaulpedda—; *Sanskrit:* Karahata, Kurangaha, Pindara—; *Tamil:* Attarasu, Attupuvarasu, Kanji, Naykkumil, Sannattuvarai—; *Telugu:* Eruponaku—; *Uriya:* Monda, Pithaliya—.

MALLOTUS Lour.

Trees or shrubs. Leaves opposite or alternate, entire, toothed or 3-lobed, penninerved or 3-7-nerved, sometimes peltate often gland-dotted beneath and sometimes with glandular areas at the base above. Flowers dioecious or monoecious, small or minute, in axillary or terminal simple or branched spikes or racemes, the males fascicled, the females solitary in the bracts. Perianth simple. Male flowers :

Calyx globose or ovoid, 3-5-partite; lobes valvate. Petals 0. Disk 0. Stamens numerous, crowded on a flat or convex receptacle; filaments free; anthers small, dorsifixed, the cells globose or shortly oblong, parallel, adnate to the wide connective, often discrete. Pistillode 0 or minute. Female flowers : Calyx spathaceous or valvately 3-6-lobed or partite. Petals 0. Disk 0 or small. Ovary 2-4-celled; ovule 1 in each cell; styles free or connate below, spreading or recurved above, entire, plumose or papillose. Fruit a capsule of 2-3 (rarely 4) 2-valved tuberculate, echinate paleaceous or smooth cocci. Seeds ovoid, oblong or globose; testa crustaceous; albumen fleshy; cotyledons broad, flat.—Species 120.—Palæotropics.

M. philippinensis Muell.-Arg. is used medicinally in the Philippine Islands, *M. oppositifolius* Muell.-Arg. in Nigeria and the Gold Coast.

OFFICIAL :—The small glands and hairs on the ripe fruits of *M. philippinensis* Muell.-Arg. (Austria, Hungary, Japan, Switzerland), —(Lamarck) Mueller Argoviensis (Germany),—Mueller=*Rottlera tinctoria* Roxburgh (Italy); *R. tinctoria* Roxb.=*M. philippinensis* Muell. (Portugal).

1. **Mallotus philippinensis** Muell.-Arg. in Linnæa XXXIV (1865) 196.—PLATE 875B.

A small much-branched tree; branchlets, young leaves, and inflorescence tawny- or rusty- pubescent. Leaves alternate, variable, 7.5-15 by 3.2-7.5 cm., ovate or ovate-lanceolate, acuminate, entire or slightly toothed, glabrous above, pubescent and with numerous orbicular red glands beneath, reticulately veined, base rounded or acute, strongly 3-nerved at the base and with 4-7 pairs of nerves above the basal ones; petioles 2.5-5 cm. long, cylindric, fulvous-pubescent, with 2 small sessile glands one on each side of the summit. Flowers dioecious, small; the males clustered, sessile or very shortly pedicellate, in erect terminal spikes which are usually several together and often longer than the leaves; the females sessile or nearly so, in short spikes. Male flowers : Sepals 4 (rarely 5), 3 mm. long, lanceolate, acute. Stamens numerous. Bracts 1.5 mm. long, broadly ovate, acute. Buds globosely ovoid. Female flowers :

Calyx divided nearly to the base, sepals 3 or 4, thicker than in the male, ovate-lanceolate. Ovary with red glands, 3-celled; styles 3, simple, papillose. Capsules 8-13 mm. diam., 3-lobed, loculicidally 3-valved, covered with a bright red powder consisting of minute stellate hairs and fine grains of a red resinous substance soluble in alcohol and ether. Seeds 4 mm. diam., subglobose, black.

Distribution: Throughout tropical India, Ceylon, Burma.—Malay Islands, Australia, China.

The leaves are bitter, cooling; give appetite; cause flatulence and constipation.—The glands on the fruit are pungent, heating; purgative, anthelmintic, vulnerary, detergent, maturant, carminative, alexiteric; heal ulcers and wounds, tumours, stone in the bladder; useful in bronchitis, diseases of the abdomen, enlargement of the spleen (Ayurveda).

The glands and hairs on the fruit are bitter; anthelmintic, styptic; lessen intestinal pain; useful in scabies, ringworm, and other skin diseases (Yunani).

The powder prepared from the fruit is used as an anthelmintic, vermifuge and purgative medicine. It is also said to possess cathartic properties.

Among the Mundas of Chota Nagpur the root, well ground, is rubbed on the painful parts in articular rheumatism.

In Katha, Burma, the seeds are ground to a paste, and applied to wounds and *dah* cuts.

The granular brick red powder, consisting of small glands covering the ripe fruit, is said to be anthelmintic in cases of thread and round worms and a purgative. It was tried in the form of a liquid extract in doses of 1 to 3 fluid drachms every three hours until three doses were administered. A purgative of castor oil was given thereafter. It was found to be efficacious in expelling round and thread worms (Koman).

Kamala is quite ineffective as an anthelmintic (Caius and Mhaskar). It is also ineffective in the treatment of snake-bite (Mhaskar and Caius).

Chemically Kamala has been the subject of much study.

Almora: Roli—; *Arabic:* Kampileh, Kinbil—; *Assam:* Gangai, Jaggaru, Puddum—; *Banda:* Kamela, Reoni, Roli—; *Bengal:* Kamalagundi, Kamila, Tung—; *Bhil:* Shendrya—; *Bijnor:* Kamela, Ruinia—; *Birbhum:* Dholasindua—; *Bombay:* Kamala, Kamela, Kapela, Kapila, Ruhin, Shendri—; *Bundelkhund:* Rori—; *Burma:* Tanthieden, Tawtheeteng, Tawthidin—; *Canarese:* Chandrahittu, Ettunalige, Honne, Hullichellu, Kapila, Kesari, Kesarimavu, Kunkuma, Kunkumada, Kunkume, Munnaga, Punnaga, Purushatunga, Surahonne, Suraparni, Suvarnakesari, Vasare—; *Central Provinces:* Chamargular, Ningur, Rauni, Rori—; *Ceylon:* Kapila—; *Darjeeling:* Sinduri—; *Dehra Dun:* Raini—; *English:* Monkey Face Tree—; *Garhwal:* Rohni, Roini, Ruina—; *Garo:* Chinderpang, Machugan—; *Gond:* Koku—; *Gujerati:* Kapilo—; *Haldwani:* Roli—; *Hindi:* Kamala, Kambhal, Kambila, Kamela, Kamila, Kamud, Raini, Rauni, Rohni, Roini, Roli, Rora, Ruin, Rulu—; *Ilocano:* Buas, Vuas—; *Jaunsar:* Kambel—; *Kadir:* Manjanai, Maunana, Ponni—; *Kashmir:* Kaimbil—; *Kumaon:* Rauni, Reru, Riuna, Roli, Ruen—; *Lambadi:* Dholo—; *Lepcha:* Numboongkor, Purva, Tukla—; *Lohardugga:* Rori—; *Malayalam:* Chenkolli, Kapila, Kuramatukka, Manjana, Maunana, Piponnakam, Ponnakam, Ponni, Poonagam, Punna, Tavitu—; *Marathi:* Shendri, Shindur—; *Melghat:* Kuku—; *Michi:* Baraiburi, Sindurpong—; *Mundari:* Garisinduri—; *Nepal:* Safedmallata, Sinduria—; *North-Western Provinces:* Purvahung, Sinduria—; *Oudh:* Rohni—; *Persian:* Kampileh, Kanbela—; *Peshawar:* Kambaila—; *Punjab:* Kamal, Kambal, Kamela, Kumila, Reini, Reun, Rulya—; *Ramnagar:* Roli—; *Sanskrit:* Bahupushpa, Chandra, Kampilla, Kampillaka, Kapila, Karkasha, Kesara, Laghupatraka, Lohitanga, Madhuka, Nadivasa, Pikaksha, Punnaga, Punnagakesara, Punnama, Raktachurnaka, Raktanga, Raktaphala, Ranjaka, Rechanaka, Rechani, Rechi, Rochana—; *Santali:* Rora—; *Shan:* Tawthadin—; *Sinhalese:* Hamparandella, Hamparila—; *Tagalog:* Banato, Sala—; *Tamil:* Avam, Kabilam, Kabilappodi, Kamala, Kambosam, Kapila, Kopilapodi, Kungumam, Kurangumanjanatti, Manjanai, Suvanagesari, Tavattai, Tiruchalai—; *Telugu:* Adavigubbatuda, Benduruppu, Chendiramu, Kunkuma,

Nagarakta, Sinduragunda, Sinduri, Tunga, Vasantagandhamu, Veligarapu—; *Tulu:* Ponne—; *Urdu:* Kalileh—; *Uriya:* Bosontogundi, Kunkumo, Kopilogundi Punango, Sinduri, Sindurogundi—; *Visayan:* Sala—; *Zambales:* Apuyot—.

MACARANGA Thouars.

Trees or shrubs. Leaves alternate, often large and peltate, entire or lobed, more or less glandular beneath, 3-many-nerved at the base. Flowers usually dioecious, in axillary racemes or panicles; males many, clustered; females one or few to each bract; bracts often large, entire or toothed. Perianth simple. Male flowers minute. Calyx globose or obovoid; sepals 3-5, valvate. Petals 0. Disk 0. Stamens central, 1-3, oftener 20-30; filaments short, free; anthers terminal, short, 2-celled and 4-valved, or 3-celled and 3-valved. Pistillode 0. Female flowers : Calyx 2-4-lobed. Petals 0. Disk 0. Ovary 2-6- (rarely by abortion 1-) celled; ovule 1 in each cell; styles entire, short or long. Fruit a small capsule of 1-5 naked or echinate 2-valved cocci, often glandular or with a waxy coat. Seeds globose; testa crustaceous or bony; albumen fleshy; cotyledons broad, flat.—Species 180.—Palæotropics.

1. Leaves peltate, entire .... 1. *M. peltata.*
2. Leaves deltoid-ovate, peltate, entire .... 2. *M. indica.*

The genus is therapeutically inert.

1. **Macaranga peltata** Muell.-Arg. in DC. Prodr. XV, 2 (1866) 1010.—*M. Roxburghii* Wight. Ic. t. 1949.—*M. tomentosa* Ic. V, 2 (1852) 23 and VI, t. 1949, f. 1.—PLATE 877 (under *M. Roxburghii*).

A small or middle sized tree; bark dark grey; branchlets stout; young shoots tomentose. Leaves 12.5-20 by 8-14 cm., ovate or deltoid-ovate, or orbicular, cuspidate, broadly peltate, entire or minutely toothed, glabrous or nearly so above, more or less pubescent and closely gland-dotted beneath, base rounded; basal nerves numerous and with 6-8 pairs of strong nerves above the basal ones, with reticulate venation between; petioles 7.5-15 cm. long; stipules

ovate, acuminate, reflexed, caducous. Male flowers minute, 0.4 mm. diam., numerous, in interrupted dense sessile heads, enveloped in bracts and bracteoles, arranged in numerous much-branched axillary rusty-tomentose panicles shorter or longer than the leaves; bracts broader than long, toothed, veined; bracteoles concave. Sepals 3, minute, obovate, cuneate. Stamens 2-3. Female flowers : Panicles simpler than in the male, the branches racemose with larger bracts. Calyx-limb obsolete. Ovary densely glandular, 1-celled; stigma sessile, often embracing one side of the ovary, thickly papillose. Capsules 6-8 mm. diam., globose, hairy and glandular. Seed globose; testa brown, crustaceous, rough.

Distribution: Hills of Orissa and the Circars, W. Peninsula, Ceylon.

The gum, powdered and made into a paste, is reckoned a good external application for venereal sores.

Bombay: Chanda—; *Canarese:* Chandakanne, Chandkal, Chinthakanni, Jatiyuppalige, Kanchupranti, Kanjupparanti, Upaligi, Uppalige, Upparanti—; *Kadir:* Pimugam—; *Kanara:* Chandkal—; *Konkani:* Chandori—; *Malayalam:* Pattavanni, Uppila, Vatta—; *Marathi:* Chanda, Chandoda, Chandora, Chandwar—; *Mysore:* Chenthakanni—; *Sinhalese:* Bukenda, Kenda—; *Tamil:* Vatta, Vattikanni, Vattittutti—; *Telugu:* Boddi, Kondajaphara, Kondatamara, Pulichinjalamu—.

2. **Macaranga indica** Wight Ic. V, 2 (1852) 23, t. 1883 and t. 1949, f. 2.

A large tree; branchlets stout, glaucous, marked with leaf-scars; young parts with rusty deciduous tomentum. Leaves 18-25 cm., peltate, ovate-orbicular, acute, glabrous above, pubescent and thickly covered with minute dark glands beneath; petiole longer than leaves, cylindrical, glaucous; stipules ovate, acuminate, caducous; male panicles narrow, fulvous-pubescent; bracts minute, with a large glandular appendage; female panicles larger, flowers on long divaricate pedicels; male flowers : Stamens 3-8; female flowers : ovary usually 2-celled, styles 2, subulate, recurved. Fruit very small, under 6 mm., of 2 globose glandular cocci.

Distribution: E. Himalaya, Mishmi Hills, Khasia Mts., Deccan Peninsula, Andaman Islands, Ceylon.

The gum is applied to sores.

Ceylon: Vattakkanni—; *Kumaon:* Ramalo—; *Malayalam:* Puthatamara—; *Malkot:* Papri—; *Nepal:* Malata—; *Tamil:* Vuttuttamara—.

HOMONOIA Lour.

Rigid shrubs. Leaves alternate, narrow and subentire, or short and toothed, glandular-lepidote. Flowers usually diœcious, in many or few flowered axillary spikes or from the old wood. Perianth simple. Male flowers: Calyx globose, splitting into 3 valvate segments. Petals 0. Disk 0. Stamens many, in a dense globose cluster of repeatedly branching filaments; anthers with subglobose cells, sessile on the filament-branches, divaricate, the connective obscure. Pistillode 0. Female flowers: Sepals 5-8, narrow, imbricate, unequal. Petals 0. Disk 0. Ovary 3-celled; ovule 1 in each cell; styles entire or slightly connate at the base, spreading. Capsule small, of three smooth 2-valved cocci. Seeds rounded on the back, slightly angular on the inner face; testa crustaceous, hard, with a thin fleshy coat; albumen fleshy; cotyledons broad, flat.—Species 4.—Indo-Malaya.

The genus is not defined therapeutically.

H. riparia Lour. is used medicinally in Cambodia.

1. **Homonoia riparia** Lour. Fl. Cochinch. (1790) 637.—*Adelia neriifolia* Roth Nov. Pl. Sp. 375; Wight Ic. t. 1868.

A rigid evergreen willow-like shrub; branchlets, young leaves and inflorescence pubescent. Leaves numerous, erect, all closely set, 7.5-15 by 1-2 cm., linear-oblong or linear-lanceolate, acute, apiculate, entire or more or less toothed, glabrous above, clothed beneath with scattered and numerous minute orbicular scales, base acute or rounded; main nerves numerous, 10-30 pairs with reticulate venation between; petioles 3-10 mm. long; stipules 4 mm. long, linear-lanceolate, acute. Flowers diœcious, sessile, in axillary bracteate spikes 5-12.5 cm. long; rhachis pubescent; bracts ovate, acuminate, pubescent, 2 mm. long. Male flowers: Sepals 3, broadly elliptic, acute, concave, veined, glabrous, 3 mm. long. Stamens very

numerous, in globose heads; anthers red. Female flowers: Sepals usually 5, narrowly ovate, acuminate, 2.5 mm. long. Ovary pubescent; styles 3, shortly connate at the base, nearly 6 mm. long, papillose. Capsules globose, 3 mm. diam., tomentose. Seeds 1.6 mm. long, rounded on the back, slightly angular on the inner face, smooth, yellowish brown.

Distribution: Rocky river-banks, Assam, N. Bengal, Burma, Central Provinces, W. Peninsula, Ceylon.—Cochin-China, Java.

The root is given for ulcers, strangury, urinary discharges, vesical calculi (Ayurveda).

The root is laxative and diuretic. A decoction is given in piles, stone in the bladder, gonorrhœa, and syphilis.

In Cambodia, an infusion of the wood is given in paludism. The whole plant is considered depurative.

Burma: Momaca, Yaetagyiben, Yaetakyee—; *Cambodia:* Rey tuk—; *Gond:* Sundeh—; *Konkan:* Sherana—; *Kumaon:* Kandagar—; *Kurku:* Jeljambu—; *Lepcha:* Mongthel—; *Malayalam:* Katalluri—; *Mundari:* Garahuri—; *Nepal:* Kholaruis—; *Philippines:* Lumanaja, Mimbre—; *Sanskrit:* Kshudrapashanabheda, Pashanabedaka—; *Tagalog:* Agoyoy, Agucuc, Balanti, Dumanai, Lumanai—; *Telugu:* Cheppunjerinjal, Taniki—; *Visayan:* Mayagos, Mayoyos, Miagos—.

RICINUS Linn.

A tall glabrous and glaucous annual, sometimes shrubby or tree-like. Leaves alternate, broad, palmately lobed; lobes 7 or more, serrate. Flowers monoecious, rather large, in terminal subpaniculate racemes. Perianth simple and without any disk, the male flowers crowded in the upper portion of the inflorescence, the females below. Male flowers: Calyx membranous, splitting valvately into 3-5 segments. Stamens very many; filaments connate and repeatedly branched; anthers with distinct distant subglobose divergent cells. Pistillode none. Female flowers: Calyx spathaceous, caducous. Ovary 3-celled; styles entire, 2-fid or 2-partite; ovules solitary in each cell. Fruit a prickly capsule of three 2-valved cocci. Seeds

oblong, testa crustaceous, albumen fleshy; cotyledons broad, flat.—Species 1.—Tropical Africa.

R. communis Linn. is used medicinally wherever it is found growing.

The leaves and the seeds are official in Portugal; the seeds and the oil in France and Italy; the oil in Austria, Belgium, Denmark, Great Britain, Holland, Hungary, Japan, Norway, Russia, Spain, Sweden, Switzerland, Turkey, and the United States.

1. **Ricinus communis** Linn. Sp. Pl. (1753) 1007.—PLATE 878.

Characters of the genus.

Distribution: Probably of African origin, now widely cultivated in tropical countries.

The root is sweetish, heating; carminative; useful in inflammations, pains, ascites, fever, glands, asthma, eructations, bronchitis, leprosy, diseases of the rectum, and the head.—The leaves are useful in "vata" and "kapha", intestinal worms, strangury, night blindness, earache; increase biliousness.—The flowers are useful in glandular tumours, anal troubles, vaginal pain.—The fruit is heating and an appetiser; useful in tumours, pains, "vata", piles, diseases of the liver and spleen.—The seed is cathartic and aphrodisiac.—The oil is sweetish; cathartic, aphrodisiac, anthelmintic, alterative; useful in tumours, diseases of the heart, slow fevers, ascites, inflammations, typhoid, pain in the back, lumbago, leprosy, elephantiasis, convulsions; increases "kapha"; causes biliousness (Ayurveda).

The root bark is purgative, alterative; good in skin diseases.—The leaves are galactagogue; good for burns.—The seeds and the oil from them have a bad taste; purgative; useful in liver troubles, pains in the body, lumbago, boils, piles, ringworm, paralysis, inflammations, ascites, asthma, rheumatism, dropsy, amenorrhœa (Yunani.)

The leaf is applied to the head to relieve headache, and is commonly used as a poultice for boils.

The seeds and the oil from the seeds are used as a purgative wherever the plant is found growing. The Chinese use the crushed

seeds more frequently than they do the oil, the paste is applied to relieve scrofulous sores.

In Las Bela, the oil is expressed and used medicinally; and a fomentation is made with the leaves to cure wounds. At Turbat in Makran, it is used as an ointment for sores. At Kotra in Kachhi, the leaves are used for fomentations; in Kharan, they are bound over boils, and are a good cure (Hughes-Buller).

In French Guinea, the leaves are boiled and used as a febrifuge.

An infusion of the leaf is a Zulu remedy for stomach-ache. It is administered orally or as an enema. The Zulus also apply a paste of the root in toothache.

In Southern Rhodesia, the bark is used by natives for stitching up wounds, and as a dressing for wounds and sores. The Chewas boil the root in water which has been previously boiled with the ashes of maize stalks. The sediment from the second boiling is smeared on the teeth and gums to relieve toothache, the material not being swallowed.

The Transvaal Sutos apply the powdered roasted seeds to sores, boils, etc., in children. The foliage is considered emmenagogue, the root-bark purgative, and the leaf useful as a local application in rheumatism. The local application of the leaf to the mammæ is said to produce a powerful galactagogic action.

The bruised leaves are used for caries of the teeth and given with water for colic in Madagascar.

In La Reunion, the leaves are considered lactagogue and are given in infusion or applied to the breasts.

In Guiana, the leaves are applied to the breasts to help the secretion of milk. Soaked in vinegar they are applied to the forehead in cases of sunstroke. They act as a powerful sudorific.

The oil cannot be recommended as an anthelmintic (Caius and Mhaskar).

The seed is prescribed in the treatment of snake-bite (Sushruta, Yogaratnakara) and scorpion-sting (Sushruta); but it is not an antidote to either snake-venom (Mhaskar and Caius) or scorpion-venom (Caius and Mhaskar).

Afghanistan: Bazanjir, Buzanjir—; *Afrikaans:* Kastero-lieboom—; *Almora:* In—; *Amboyana:* Camiri—; *Aowin:* Ateende—; *Arabic:* Charua, Khirwa—; *Assam:* Eri—; *Awuna:* Dzonggbale—; *Bengal:* Bherenda—; *Behar:* Anda, Anrar, Lenr, Renr—; *Betsileo:* Kinamena—; *Bombay:* Erendi—; *Brazil:* Carapateiro, Figueira d'inferno, Mannona, Nhambuguasu—; *Burma:* Kesu, Kyeksu—; *Cambodia:* Lohong preng—; *Canarese:* Avudala, Avudalu, Chittuharalu, Eranda, Haralu, Manda, Vardhamana—; *Catalan:* Figuera infernal, Rissino—; *Central Provinces:* Grundi—; *Chinese:* Pi Ma—; *Coimbatore:* Kotteimuttu—; *Danish:* Undertroee—; *Deccan:* Erund, Ind, Rund, Yarand—; *Dutch:* Wonderboom—; *Egypt:* Kiki—; *English:* Castor-oil Plant, Palma Christi—; *Ewe:* Dzongbati, Lornggor, Kasuworliti—; *Fanti:* Abronkruma, Adedenkuruma, Erusonkuruma, Sunsumnkuruma—; *French:* Bois de carapat, Carapat, Grand ricin, Palma Christi, Paume Dieu, Pignon de Barbarie, Ricin, Ricin commun, Ricin vulgaire—; *French Guiana:* Palma Christi—; *Fulah:* Diakoula—; *Ga:* Adedengkuruma—; *Genoa:* Ricin, Ricinu—; *German:* Wunderbaum—; *Gond:* Nerinda—; *Greek:* Kiki—; *Gujerati:* Diveli, Diveligo, Tirki—; *Hausa:* Zurma—; *Hindi:* Arand, Arandi, Arend, Erand, Erandi, Erend, Ind, Rand—; *Hova:* Tanantanankisoa—; *Hungarian:* Ricinus—; *Ilocano:* Tangantangan, Tavatavangsina, Tawatawasinga—; *Italian:* Caffe da olio, Catapuzia maggiore, Erba venaria, Fagiolo d'India, Fagiolo romano, Fava d'India, Fico d'inferno, Girasole, Mirasole, Palma Christi, Palmaperta, Ricino—; *Kachhi:* Harnoli—; *Kharan:* Murghpad—; *Kikuyu:* Mubariki—; *Konkani:* Erendi—; *Krepi:* Atornggor, *Krobo:* Kumenglo—; *Kumaon:* Andi, Arandi, Indrendi—; *La Reunion:* Ricin tantan—; *Las Bela:* Hiranr—; *Lepcha:* Raklop—; *Makran:* Murpad—; *Malasar:* Tonda—; *Malay:* Jarak—; *Malaya:* Pee mah—; *Malayalam:* Amandam, Avanakka, Chittavanaku, Erandam, Gandharvahastakam, Kotta, Panjangulam, Pantiyavanakku, Varddhamanam—; *Malta:* Castor-oil Plant, Palma Christi, Ricino, Ricnu—; *Marathi:* Erandi, Yarandicha—; *Masai:* Oldule—; *Mentone:* Ricinu—; *Mexican:* Tlapatli—; *Mundari:* Bindidaru, Ranggabindi, Ranggafara—; *Nandi:* Imanyet—;

Nasirabad: Harnauli—; *Nepal:* Alha, Areta, Orer, Reri—; *North-Western Provinces:* Arand, Bhatreri, Rendi, Reri—; *Pahouin:* N'zoum—; *Pedi:* Mokhura—; *Persian:* Bedanjir, Bedanjira—; *Portuguese:* Carrapateiro, Mammona, Palma Christi, Ricino—; *Portuguese Africa:* Bafureira—; *Potenza:* Ricin—; *Punjab:* Aneru, Arand, Arind, Bedanjir, Harnauli—; *Pushtu:* Arhand—; *Rajputana:* Arend, Edia—; *Reggio:* Rizoin—; *Roumanian:* Ritina—; *Russian:* Kleshtshevika—; *Sakalave:* Kinana, Tanantanamanga—; *San Remo:* Ricin—; *Sanskrit:* Amanda, Amangala, Bhanda, Chankuka, Chitrabija, Chitraka, Dirghadantaka, Eranda, Gandharvahasta, Gandharvahastaka, Ishta, Kanta, Panchangula, Panjangula, Ruvuka, Shukla, Shulashatru, Svehaprada, Taruna, Triputi, Triputiphala, Tuchhadru, Vardhamana, Vatari, Vranaha, Vuka, Vyadatvaka, Vyaghradala, Vyaghrapuchha—; *Santali:* Eradom—; *Sarawan:* Bedanjir—; *Sardinia:* Cacamengiu—; *Sibi:* Harnauli—; *Sicily:* Rigginu—; *Sind:* Ayrunkukri, Heran—; *Sinhalese:* Eudaru, Telendaru—; *South Africa:* Castor Bean, Castor-oil Plant, Palma Christi—; *Spanish:* Higuera del diablo, Higuera infernal, Palma Christi, Ricino—; *Sumatra:* Jarak—; *Suto:* Mokhura—; *Swahili:* Mbariki—; *Swedish:* Undertrard—; *Tagalog:* Lansina, Lingasina, Tangantangan—; *Tamil:* Aimugi, Amanakku, Andagam, Asaram, Attagam, Attamanam, Attugam, Erandam, Kottai, Kottaimuttu, Muttukkottai, Peramanakku, Sanju, Sasambari, Sigandi, Sittaman, Sittamanakku, Sittiram, Tabinjam, Urppulam, Vattamam—; *Telugu:* Amudamu, Chittamudamu, Erandamu, Peramudamu—; *Tigré:* Kella—; *Tigrinia:* Vulleh—; *Treviso:* Rizin, Rizino—; *Turkish:* Hint—; *Tuscany:* Erba da latte, Erba lattaria, Girasole maggiore, Girasole piccole, Manoaperta, Meo, Scatapuzia, Zecca, Zecche—; *Twi:* Adadenkuruma—; *Urdu:* Eranda—; *Uriya:* Bheronta, Chitroko, Erondo, Gobo, Joda, Kalo, Monto, Tindoko—; *Verona:* Rizino—; *Xosa:* umHlavuthwa—; *Zulu:* umHlakuva—.

BALIOSPERMUM Bl.

Erect shrubs. Leaves alternate, sinuate-toothed or lobed, penni-nerved or 3-5-nerved from the base, 2-glandular at the base.

Flowers small, monoecious or dioecious, paniculate or racemose. Male flowers globose; sepals 4-5, membranous, orbicular, concave, imbricate. Petals 0. Disk of 4-6 glands. Stamens 10-30; filaments slender, free; anthers terminal, the cells adnate throughout to the broad connective, dehiscing at first introrsely, the slits ultimately lateral. Pistillode 0. Female flowers : Sepals 5-6, lanceolate, entire or toothed, sometimes accrescent in fruit. Petals 0. Disk entire. Ovary 3-celled; ovule solitary in each cell; styles rather long; 2-fid or 2-partite; stigmas smooth (not fimbriate). Capsule of three 2-valved crustaceous cocci. Seeds ovoid; testa crustaceous; albumen fleshy; cotyledons broad, flat.—Species 10.—Indo-Malaya.

The genus is therapeutically inert.

1. **Baliospermum montanum** Muell.-Arg. in DC. Prodr. XV, 2, 1125.—*B. axillare* Bl. Bijdr. (1825) 604.—*B. polyandrum* Wight Ic. t. 1885.—PLATE 879 (under *B. axillare*).

A leafy stout usually monoecious undershrub 0.9-1.8 m. high with herbaceous branches from the root, glabrous except the young shoots and sometimes the leaves beneath. Leaves sinuate-toothed, the upper small, lanceolate, penninerved, the lower large, reaching 15-30 cm. long and often as broad, ovate, often palmately 3-5-lobed, base rounded or cuneate, 2-glandular; petioles 5-15 cm. long; stipules of 2 glands. Flowers in numerous axillary racemes or contracted panicles, all male or with a few females below. Male flowers : Calyx globose, 2.5 mm. long, 4-5-partite, glabrous or slightly pubescent; segments suborbicular, concave, imbricate, membranous, finely mottled. Disk of 6 glands. Stamens about 20. Female flowers : Sepals ovate-lanceolate, pubescent, not accrescent in fruit. Disk 2.5 mm. diam., thin, entire. Ovary hairy; styles about 1.5 mm. long, thick, 2-partite, dull red, the stigmatic surface smooth, not fimbriate. Capsules 8-13 mm. long, obovoid, usually hairy, of three 2-valved crustaceous cocci. Seeds 8 by 5 mm., ellipsoid, quite smooth, mottled.

Distribution: Bihar, N. Bengal, Chota Nagpur, Assam, Burma, Malay Peninsula, W. Peninsula.—Malaya.

The root is pungent, heating; purgative, anthelmintic, diuretic, alexiteric; useful in pains, diseases of the skin and of the abdomen,

piles, wounds, enlarged spleen, itching, inflammations, anæmia, leucoderma, jaundice (Ayurveda).

The seeds are used as a drastic purgative, but in overdoses are an acro-narcotic poison; they are sometimes used as a substitute for *Croton tiglium*. They are also used externally as a stimulant and rubefacient. The oil is a powerful hydragogue cathartic, and is useful for external application in rheumatism. Madden states that to the east of the Sutlej the leaves are in high repute for wounds, and the sap is believed to corrode iron. The root is considered cathartic, and is used in dropsy, anasarca, and jaundice.

A decoction of the leaves is said to be useful in asthma.

The root is equally useless in the treatment of snake-bite (Mhaskar and Caius) and scorpion-sting (Caius and Mhaskar).

Arabic: Habbussalatinebarri, Habbussalatinesahrai—; *Bengal:* Danti, Hakum, Hakun—; *Bombay:* Dantimul, Jamalgota—; *Burma:* Natcho—; *Canarese:* Danti, Kaduharalu—; *Cutch:* Dantimul, Jamalgota—; *Gujerati:* Dantimul, Jamalgota—; *Hindi:* Danti, Hakum, Hakun—; *Lepcha:* Poguntig—; *Malayalam:* Dantika, Katalavanakku, Nakadanti, Nervalam, Niratimuttu—; *Marathi:* Danti—; *North-Western Provinces:* Janglijamalgota—; *Persian:* Bedanjirekhatai—; *Sanskrit:* Anukheti, Anukula, Bhadra, Danti, Dantika, Erandapatri, Erandaphala, Gunapriya, Jayapala, Kumbhi, Madhupushpa, Makunaka, Nagadanti, Nagasphota, Nepala, Nikumbhi, Nishalya, Nishkumbha, Pratyakparni, Raktadanti, Rechani, Ruksha, Shighra, Shwetaghanta, Shyenaghanta, Taruni, Udumbaraparni, Upachitra, Varahangi, Vishalya, Vishodhini—; *Tamil:* Kattamanakku, Niradimuttu, Nirettimuttu, Peyamanakku—; *Telugu:* Ettadundiga, Kanakapata, Kondamudamu, Nelajidi—; *Uriya:* Donti—.

TRAGIA Plum. ex Linn.

Perennial, usually twining or climbing herbs, hispid with stinging hairs. Leaves alternate, simple or palmately 3-lobed, serrate, 3-5-nerved at the base. Flowers monoecious, in terminal and leaf-opposed androgynous racemes, the males uppermost in the raceme the females below, few. Perianth simple. Male flowers :

Calyx globose or obovoid, valvately 3-5-partite. Petals 0. Disk 0 or obscure. Stamens 1-3 (rarely many); filaments free or connate; anthers ovate or oblong, the cells contiguous, parallel. Pistillode minute, 3-fid or 0. Female flowers: Sepals 6, imbricate, entire or pinnatifid, often enlarged hardened and stellately spreading in fruit. Petals 0. Disk 0. Ovary 3-celled; ovule 1 in each cell; styles united in a column at the base, free, spreading and entire above. Fruit a capsule of three 2-valved cocci; endocarp crustaceous. Seeds globose; testa crustaceous; albumen fleshy; cotyledons broad, flat.—Species 55.—Tropics and subtropics.

T. volubilis Linn. is used medicinally in South America and the West Indies, *T. meyeriana* Muell.-Arg. in Zululand.

T. angustifolia Benth. and *T. cordifolia* Benth. are considered toxic in Madagascar.

1. **Tragia involucrata** Linn. Sp. Pl. (1753) 980.—PLATE 880.

A perennial more or less hispid herb, with scattered stinging hairs; stems elongate, slender, twining. Leaves 2.5-10 by 2-5 cm., variable, oblong-lanceolate to broadly ovate, acuminate, serrate, hairy, base rounded or cordate; petioles 3-16 mm. long; stipules 6 mm. long, ovate, acute, somewhat auricled at the base. Flowers shortly pedicellate, in terminal axillary and leaf-opposed usually hairy recemes 2.5-5 cm. long, the males in the upper part, yellowish, the females few (rarely many) in the lower part of the raceme; bracts 2.5 mm long, lanceolate, acute. Male flowers: Sepals 3, broadly elliptic or orbicular, concave, 1.5 mm. long, glabrous. Stamens 3. Pistillode small, 3-fid. Female flowers: Sepals 6, ovate, pinnatifid, very hispid, 3 mm. long, much elongating and becoming rigid in fruit. Ovary 3-lobed, hispid; styles 3, circinately revolute, united below in a stout cylindric column often as long as the branches. Capsules 8 mm. diam., 3-lobed, white, more or less hispid. Seeds globose, smooth.

Distribution: Throughout India, Ceylon.—China.

The root is considered diaphoretic and alterative; an infusion is given in ardent fever and in itching of the skin.

In the Konkan, a paste of the root is used to aid the extraction of guinea-worm; mixed with the juice of *Ocimum sanctum* it is employed as a cure for itchy skin eruptions.

In Chota Nagpur, the root is given when the extremities are cold during fever; also for pains in the legs and arms (Campbell).

The root also forms the basis of an external application in leprosy.

The leaves enter into the preparation of an errhine which is prescribed in cases of headache (Taylor).

The fruit rubbed over the head with a little water is useful in cases of baldness (Thornton).

The root of this plant has diaphoretic property and is therefore given in fevers to cause perspiration. A decoction of this root 1 in 10 was found to be useful in relieving bronchitis and the attendant fever (Koman).

The fruit is not an antidote to scorpion-venom (Caius and Mhaskar).

Bengal: Bichati—; *Bombay:* Khajkholti, Kanchkuri—; *Canarese:* Dulagondi, Kiriberalu, Kiruberalu, Kiriturache, Sannaturachi, Turachi—; *Deccan:* Kanchkure—; *Hindi:* Barhanta—; *Malayalam:* Cherukodithuva, Chorinnanam, Choriyanam, Kotittuva—; *Sanskrit:* Duralabha, Dusparcha, Grahini, Kachchura, Kasaghni, Samudranta, Virupa, Vrishchikali, Vrishchikapatri—; *Santal:* Sengelsing—; *Sinhalese:* Welkahambiliya—; *Tamil:* Ambu, Cherukanjuru, Erumaikkanjori, Kanjori, Kandudi, Kannichi, Karuppukkanjori, Kunasagam, Kurundotti, Punaikkanjori, Samuttirandam, Sendotti, Siruganjori, Tanavaiyadam, Turalobam, Turpparigam, Vellaikkanjori—; *Telugu:* Chinnadulagondi, Dulagondi, Dulagundi, Peddadulagondi, Regadadula, Revatidulagondi, Telumani, Tigedulagondi—; *Tulu:* Pachcherengi, Turuse—; *Uriya:* Bichhuati—.

SAPIUM P. Br.

Trees and shrubs. Leaves alternate, entire, serrate or toothed, penninerved; petiole often 2-glandular at the apex. Flowers monoecious, in terminal simple or branched spikes or racemes, the

males above, several in each bract, the females in the lower part of the spikes or in separate spikes, solitary in the bracts. Male flowers: Calyx membranous, shortly 2-3-lobed or toothed, or splitting to the base into 2-3 valvate segments. Petals 0. Disk 0. Stamens 2 or 3; filaments free; anther-cells ovoid, distinct, contiguous, parallel. Pistillode 0. Female flowers: Calyx 3-fid or 3-partite. Petals 0. Disk 0. Ovary 2-3-celled; ovule 1 in each cell; styles free or connate at the base, spreading and recurved, entire. Fruit a crustaceous capsule, fleshy or pulpy, rarely woody, ultimately loculicidally 3-valved. Seeds globose, or ovoid, estrophiolate, usually long-persistent on the columella; testa crustaceous; albumen fleshy; cotyledons broad, flat.—Species 100.—Warm countries.

1. Leaves shortly petioled, elliptic-lanceolate, obtusely acuminate, serrate or subserrate .... 1. *S. indicum.*
2. Leaves elliptic or oblong-lanceolate, acuminate, crenate-serrate .... 2. *S. insigne.*
3. Leave long-petioled, ovate, orbicular-ovate or subrhombic, quite entire, finely acuminate .... 3. *S. sebiferum.*

Juice highly poisonous, sometimes used as a vesicant.

S. sebiferum Roxb. is said to be used medicinally in China, *S. grahamii* Prain. is so used in the Gold Coast.

1. **Sapium indicum** Willd. Sp. Pl. IV (1805) 572; Wight Ic. t. 1950.—*Excoecaria indica* Muell.-Arg. in DC. Prodr. XV, 2, 1216. PLATE 881.

An evergreen tree, all parts glabrous; bark smooth, ash-coloured. Leaves oblong to elliptically oblong, obtuse or acute at the base, on a 6-8 mm. long petiole, shortly bluntish acuminate, with a mucro, 2.5-10 cm. long, chartaceous, serrulate or crenate-serrulate, glabrous, the lateral nerves very thin and faint. Flowers small, yellowish, shortly pedicelled, forming glabrous racemes at the end of the branchlets or of the axillary shoots, the females at the base and few in number; calyx 3-merous; stamens usually 3. Ovary 3-celled; styles 3, long, connate at the base. Capsules dry and woody, the size of a small wood-apple, almost globular, usually 3-coccus, somewhat lenticellate-roughish or smooth. Seeds smooth, pale coloured, not arillate.

Distribution: From the Sundribuns to Tenasserim.

The juice of this tree is reckoned of a very poisonous nature. The taste of the fruit is nauseous beyond description. The seeds are used for intoxicating fish.

Bengal: Batan, Batul, Huru, Hurua—; *Bombay:* Hurna—; *Malay:* Gurah, Guring—; *Malayalam:* Karmmatti, Venkshiri—; *Sinhalese:* Kirimakulu, Kirrimakalu—.

2. **Sapium insigne** Trim. Syst. Cat. Ceyl. Pl. (1885) 83.—*Falconeria malabarica* Wight Ic. t. 1866.—PLATE 882.

A middle sized glabrous deciduous tree, with a thick milky poisonous juice, thick branches and bright green foliage. Leaves crowded towards the ends of the branches, 12.5-25 by 5-8 cm., elliptic-lanceolate or oblong-lanceolate, acuminate, crenate-serrate, often with a few glands on the margin, glabrous, base acute, sometimes unequal-sided; main nerves 10-16 pairs, slender; petioles 2.5-4.5 cm. long with 2 conspicuous glands at the apex. Flowers appearing when the tree is bare of leaves, monoecious, in unisexual robust spikes 7.5-20 cm. long, the males sessile, the females sessile or very shortly pedicellate, the female spikes much thickened in fruit. Male flowers in round clusters 6-8 mm. diam., the central flower opening first. Sepals 2, orbicular, concave, 1.5 mm. diam. Stamens 2; filaments very short. Female flowers : Sepals ovate, acuminate, 1.5 mm. long. Ovary ovoid, glabrous; styles 3, short, spreading, shortly connate at the base. Capsules 8 mm. diam. 2-3-celled, globosely ovoid, fleshy at first, dry and irregularly dehiscent when ripe, packed closely together along the rhachis. Seeds 6 mm. long and broad, ovoid, somewhat compressed, smooth, pale.

Distribution: Sub-Himalayas, Assam, Chittagong, W. Peninsula, Ceylon.

The whole tree is full of an acrid milk which, when applied to the skin, produces vesication.

Almora: Khin—; *Annamalais:* Garpashola—; *Bombay:* Dudla—; *Canarese:* Kannupade, Kurda, Nanaka—; *Ceylon:* Tilai—; *Dehra Dun:* Khindra, Khinna, Khinni, Khirni—; *Garhwal:* Khindra, Khinna, Khindri, Khinni—; *Hindi:* Khina, Khindra, Khinna, Lendwa, Lienda—; *Kadir:* Karuppuchchulai—; *Marathi:* Dudla, Hure, Ura, Ure—; *North-Western Himalaya:* Boddar, Khinna—; *Punjab:* Bilodar,

Biloja, Dudla, Karalla, Ledra—; *Sinhalese:* Telkoadura—; *Telugu:* Garbhasula—; *Tulu:* Kannupade—.

3. **Sapium sebiferum** Roxb. Fl. Ind. III (1832) 693.

A tree, all parts quite glabrous. Leaves broadly rhomboid-ovate, on a slender petiole 2.5-6.3 cm. long, somewhat truncate or almost cuneate at the 2-glanded base, shortly and abruptly acuminate, 3.8-5 cm. long and usually somewhat broader, chartaceous, entire, glabrous, glaucescent beneath. Flowers small, yellowish, shortly pedicelled, the males numerous to each broad ovate bract, the females few at the base of the terminal or rarely spuriously axillary glabrous racemes; calyx of both sexes 3-parted; stamens 3 or 2, free; ovary glabrous, the styles simple, connate at the base. Capsules fleshy, when fully ripe capsular-dehiscing, 3-coccus, the size of a small cherry, smooth and somewhat glaucescent. Seeds enveloped in a soapy white arillus-like mass.

Distribution: A native of China and Japan. Cultivated in India.

The acrid juice is a powerful vesicant.

Bombay: Pipalyank—; *Chinese:* Wu chiu—; *Dehra Dun:* Tarcharbi—; *English:* Chinese Tallow Tree—; *Hindi:* Vilayati-shisham—; *Saharanpur:* Paharishisham—; *Sanskrit:* Agaru, Toyapippali—; *Uriya:* Ronojita—.

Excoecaria Linn.

Glabrous trees or shrubs with acrid milky juice. Leaves alternate or opposite, entire or subserrate. Flowers dioecious or monoecious, in lateral axillary or terminal 1-sexual or androgynous racemes or spikes; males 1-3 in each bract, 2-bracteolate; females at the base of the raceme or in separate racemes; rhachis with large glands beneath or at the side of the bracts. Perianth simple. Male flowers: Sepals 3, small, subequal. Petals 0. Disk 0. Stamens 3; filaments free; anthers didymous, the cells globose, distinct, contiguous, parallel. Pistillode 0. Female flowers: Calyx 3-fid or 3-partite. Petals 0. Disk 0. Ovary 3-celled; ovule 1 in each cell; styles stout, shortly connate below, spreading and recurved above, entire. Fruit a 3-coccus capsule, the cocci separating from the columella with

elastically twisted valves. Seeds subglobose or 3-gonous, estrophiolate; testa crustaceous; albumen fleshy; cotyledons broad, flat.—Species 30.—Tropics except America.

1. A small evergreen tree .... 1. *E. agallocha.*
2. A deciduous shrub .... 2. *E. acerifolia.*

The genus exhibits acrid vesicant properties.

1. **Excoecaria agallocha** Linn. Syst. Nat. ed. 10 (1759) 1288.—PLATE 883.

A small poisonous evergreen tree with white highly acrid juice. Leaves alternate, thickly coriaceous, 5-10 by 3.2-5 cm., elliptic, acuminate, entire or shallowly sinuate-crenate, base acute; petioles 1.3-3.2 cm. long. Flowers minute, fragrant, yellowish green; bracts rounded, fleshy. Male flowers sessile, in numerous catkin-like spikes 2.5-5 cm. long; bracts with 1 flower and several minute bracteoles. Sepals minute, unequal, subserrulate. Stamens long, exserted. Female flowers pedicellate. Racemes few, 1.3-2.5 cm. long, the upper flowers usually imperfect. Sepals broadly ovate, acute, subserrulate. Styles free nearly to the base. Capsules very variable in size, 6-25 mm. diam. Seeds subglobose, smooth.

Distribution: Sundribuns, Burma, W. Peninsula, Ceylon, Malay Peninsula.—Indian Archipelago, N. Australia, New Caledonia.

The milky juice, which exudes from the bark of this tree when green and fresh, is very acrid and injurious to the eyes, hence it is called "the blinding tree of India."

A decoction of the leaves is occasionally given by Hindu doctors in epilepsy, in the quantity of a quarter of a teacupful twice daily. This decoction is also used as an application to ulcers.

From the lower part of the trunk and roots, a soft, light, reddish suber is obtained, which is sold by the itinerant medicine men of Western India, under the name of *Tejbul*, as an aphrodisiacal tonic.

In Fiji, it is employed for the cure of leprosy, its mode of application being very singular. The body of the patient is first rubbed with green leaves; he is then placed in a small room and bound hand and foot, when a small fire is made of pieces of the wood of this tree from which rises a thick smoke; the patient is

suspended over this fire, and remains for some hours in the midst of the poisonous smoke and under the most agonizing torture, often fainting. When thoroughly smoked, he is removed, and the slime is scraped from his body; he is then scarified and left to await the result. In some cases he is cured, but frequently the patient dies under the ordeal.

The milky latex obtained from the bark when it is green is used by Malays as an irritant poison; it is so acrid when fresh that it blisters the skin. In Kelantan, it is given internally as a poison.

Andamans: Yekin—; *Bengal:* Gangwa, Gengwa, Geogheria, Geor, Geria, Goria, Uguru—; *Bombay:* Geva—; *Burma:* Kayau, Kayaw, Tayau, Tayaw—; *Canarese:* Hara, Haro—; *English:* Blinding Tree—; *French:* Agalloche vrai, Bois d'agalloche, Bois d'aigle, Bois calambac, Faux bois calambac, Faux calambac—; *Igorrote:* Ali—; *Malay:* Aguila, Baboeta, Babooter, Bebuta, Bubuta, Butabuta, Garamataboeta, Noto—; *Malayalam:* Katappala, Karmmatti, Komatti—; *Marathi:* Geva, Phungali, Suran, Surind, Surund—; *Marinduque:* Diladila—; *Pampangan:* Butabuta, Himbabao—; *Samoa:* Toto—; *Sanskrit:* Agaru—; *Sinhalese:* Talakiriya, Telakiriya, Tellakwiya—; *Spanish:* Arbol del ciego, Buta de Filipinas—; *Tagalog:* Botabota, Buta, Butabuta—; *Tamil:* Agadil, Agi, Ambalatti, Ambalavirukkam, Tillai, Perundillai—; *Telugu:* Chilla, Tella, Tilla—; *Uriya:* Ghona—; *Visayan:* Alipata, Himbabao, Lipata, Siac—.

2. **Excoecaria acerifolia** F. Didrichs. Plant. Nonnull. Mus. Univ. Hafn. 7.—Plate 884B.

An erect deciduous shrub 0.9-1.8 m. high with stems up to 2 cm. diam. Bark fairly smooth with scattered small pale circular lenticels. Blaze with a milky juice. Young shoots glabrous. Leaves alternate, 7.5-12.5 by 3.2-5 cm., narrowly elliptic or oblong, acuminate, finely crenate-serrate, base usually acute, glabrous, rather glossy above; lateral nerves 8-12 pairs. Petiole 3.8-7.5 mm. long. Flowers small, greenish yellow, in terminal and axillary spikes 2.5-5 cm. long, the female flowers towards the base of the spike. Capsule subglobose, about 1.3 cm. diam., coriaceous, 3-valved, the valves twisting elastically as they break away. Seeds ovoid, 5 mm. long, smooth.

Distribution: W. and Central Himalaya from Nepal to Kumaon, 5,000-6,000 ft.. Khasia Hills.

The Bhutias of East Kumaon use the leaves as a remedy for rheumatism.

Garhwal: Dudhila—; *Kumaon:* Basingh—.

SEBASTIANIA Spreng.

Shrubs, rarely a herb. Leaves alternate, penninerved. Flowers monoecious, in terminal axillary and lateral slender racemes, apetalous; males minute, 1-3 in each bract; females solitary or at the base of the raceme. Disk 0. Male flowers: Calyx minute, membranous, unequally 5- lobed or -partite. Stamens 2-4, filaments short free or nearly so; anther-cells distinct, contiguous, parallel. Pistillode 0. Female flowers: Calyx 3- lobed or -partite. Ovary exserted, 3-celled; styles free or connate at the base, entire, revolute or spreading; cells 1-ovuled. Capsule globose, of 3 cocci separating from a columella, endocarp crustaceous. Seeds oblong or subglobose, strophiolate, testa smooth, albumen fleshy; cotyledons broad, flat.—Species 80.—Tropics, chiefly American.

The genus is therapeutically inert.

1. **Sebastiania chamaelea** Muell.-Arg. in DC. Prodr. XV, pt. 2, 1175.—PLATE 884A.

An annular glabrous herb 0.3-0.6 m. high; stems numerous from a long thin tap-root, ascending, slender, grooved, ribbed or terete. Leaves 2-7.5 by 0.4-1.3 cm., linear or narrowly oblong-elliptic, obtuse, finely serrulate, base tapering; midnerve strong, prominent beneath; petioles 2-3 mm. long; stipules ovate, acute, ciliate. Flowers yellowish. Male flowers in axillary or leaf-opposed slender short spikes; bracts very small, acute, with a large often stipitate gland on each side, 1-2-flowered. Calyx minute, membranous, not covering the stamens in bud; lobes 5, ovate, acute, ciliate. Stamens usually 3; filaments distinct. Female flowers usually solitary at the base of the male, or lateral on the branches without any males. Sepals 3, larger than in the male, obovate, acute, lacerate and ciliate, 2-glandular within. Ovary much exserted; styles 3, small, undivided. Capsules

6-8 mm. long, crustaceous, subglobosely oblong, 3-coccus, the cocci with 2 rows of spinules on the back of each, separating from a persistent columella, glabrous except for the spinules. Seeds 4 mm. long, ellipsoid-oblong, rounded at both ends, yellow.

Distribution: Bihar, Deccan Peninsula, Ceylon, Burma, Malay Peninsula.—China, Malay Islands, tropical Australia, Africa.

The juice of the plant in wine is used as an astringent; a *ghrita* of the plant is considered to be tonic, and is applied to the head in vertigo.

Konkan: Bhuierendi—.

HURA Linn.

Leaves simple, alternate, broad, petioled, hairy. Flowers monoecious, apetalous; staminate calyx cupulate, truncate or denticulate; stamens generally numerous, in 2-3 whorls; style long, with flat, radiate stigma; ovules 1 to each of the 5-20 cells. Fruit large, flat.—Species 2.—Tropical America.

H. crepitans Linn. is used medicinally in Guiana. The bark and the latex are officinal in Portugal.

1. **Hura crepitans** Linn. Sp. Pl. (1753) 1008.

A tree up to 30 m. high. Leaves broad-ovate, cordate, acuminate, distantly repand-dentate. Flowers small, reddish. Capsules 7.5 cm. wide, 3.8 cm. thick, deeply many-ribbed.

Distribution: Tropical America.—Introduced into India.

In Guiana, the milky juice is considered caustic and irritant, the seeds emetic and drastic. The leaves are much used for chronic pains.

Antilles: Sand-box Tree—; *Canarese:* Retidani—; *English:* West Indian Sand-box Tree—; *French:* Arbre du diable, Sablier elastique—; *French Guiana:* Maman cacao, Sablier, Sablier elastique—; *Portuguese:* Assacu, Oassacu—; *Surinam:* Postentree—; *Tamil:* Mullarasanam—; *Telugu:* Simaburuga—; *Youri-Taboca:* Oassacu—.

MANIHOT Tourn. ex Adans.

Shrubs or weak trees, often with tuberous roots and milky juice, alternate, petioled, palmately nerved, simple or lobed or palmipartite leaves. Flowers large, monoecious, in simple rarely compound racemes, males usually above and females below. Calyx often petaloid, campanulate or urceolate, 5-lobed or 5-fid, petals 0, stamens 10 in two whorls; filaments free, inserted between the lobes or glands of the disk; pistillode 0 or 3-lobed, disk in female hypogynous, ovary 3-celled, styles shortly connate at the base, spreading, dilated or lobed at the tips, cells 1-ovuled. Capsule of three 2-valved cocci.—Species 150.—S. America to Mexico.

M. Loureiri Pohl. is used medicinally in China, *M. utilissima* Pohl. in Cambodia and Guiana, *M. dulcis* H. Bn. in La Reunion.

The starch from *M. utilissima* Pohl. is officinal in Holland.

1. **Manihot utilissima** Pohl. Pl. Braz. Ic. I (1827) 32, t. 24.

An herbaceous shrub 0.9-2.7 m., or small tree in the tropics. Roots fleshy, in a basal cluster. Leaves somewhat pubescent, deeply 3-7-parted; lobes 7.5-20 cm. long, lanceolate, acuminate; stipules small, entire. Flowers paniculate; calyx less than 1.3 cm. long, pubescent inside; capsule wing-angled.

Distribution: Brazil.—Cultivated in India.

The juice is very poisonous. In Guiana, it is boiled down to a syrup and given as an aperient. The fresh rhizome is made into poultice and applied to ulcers.

In Cambodia, the pounded tuber is applied to ulcerated wounds.

Ashanti: Bankye—; *Banda:* Ngali—; *Betsileo:* Balahazo, Mangahazo—; *Betsimisaraka:* M'Bazaha—; *Burma:* Pooloopinan-myouk—; *Cambodia:* Kdouch—; *Canarese:* Kadugenasu, Maragenasu—; *English:* Bitter Cassava, Cassava, Tapioca—; *Ewe:* Agbeli—; *French:* Mandioc, Manioc, Manioc doux, Manioque, Pain des nègres—; *French Guiana:* Manioc, Manioc amer, Manioc petit Louis—; *Ga:* Duade—; *Hausa:* Rogo—; *Hindi:* Sakarkanda—; *Hova:* Vomangahazo—; *Krepi:* Gbedi, Gbeli—; *Krobo:* Agbeli—; *Madagascar:* Kajaha, Kazaha, Matreoka, Rompotra, Tsiveritelo,

Vihazo—; *Mundari:* Edelsangga—; *Nepal:* Simaltarul—; *Nzima:* Bairdair—; *Portuguese:* Mandioca, Pau de farinha—; *Roumanian:* Manioc—; *Russian:* Manioc—; *Sakalave:* Ambazaha, Balafanapaka, Mohogo—; *Sinhalese:* Manyokka—; *Spanish:* Mandiiba, Maniba del Brasil, Manihot amarga, Manioc amarga, Mondioca, Yuca amarga, Yuca brava, Yuca casave de las Antillas, Yuca casavi de las Antillas, Yuca mortifera—; *Tagalog:* Camotingcahoy—; *Twi:* Bankye—; *Visayan:* Camotingcahoy—.

HIPPOMANE Linn.

A poisonous tropical tree. Juice milky. Leaves simple, alternate. Flowers monoecious; staminate calyx 2-3-lobed, imbricate; ovules one in each of the 6-9 cells. Fruit a drupe.—Species 1.—Warm America, W. Indies.

H. mancinella Linn. is used medicinally in Guiana.

1. **Hippomane mancinella** Linn. Sp. Pl. (1753) 1191.

A much-branched tree, 6-12 m., with thick naked twigs, terminated by the thick, smooth, broad-ovate, short-acuminate, minutely sharp-serrate, pear-like leaves, and thick spikes. Fruit berry-like, about 2.5 cm. thick.

Distribution: Tropical America.—Introduced into Indian gardens.

In Guiana, the milky juice is given for worms to children.

Cayenne: Figuier—; *Cuba:* Manzanillo—; *English:* Manchineal Tree—; *French:* Arbre de mort, Arbre poison, Bois de lait, Figuier vénéneux, Mancenillier, Noyer vénéneux—; *German:* Manzenillerbaum—.

URTICACEAE.

Herbs, shrubs, or trees. Leaves usually alternate, often oblique; stipules various. Flowers cymose or clustered, usually minute, monoecious or dioecious, 1-sexual, hermaphrodite, or rarely polygamous, often crowded on the surface of a fleshy flat concave or globose receptacle, sometimes hollow and closed (FICUS); bracts usually

small or 0, sometimes 2-4 or more, involucrate; bracteoles usually small or 0, sometimes conspicuous. Perianth simple, calycine, regular or irregular, equally or unequally toothed, lobed or partite; segments imbricate or valvate. Disk hypogynous, obscure or 0. Stamens as many as and opposite to the perianth-lobes, sometimes adnate to their base (rarely fewer or more); filaments free or rarely connate at the base; anthers 2-celled. Pistillode in male flowers small or 0. Ovary superior, 1-celled; ovule solitary; style often eccentric, simple or 2-fid with stigmatic arms, or stigma sessile, plumose or penicillate. Fruit simple, indehiscent, a drupe or samara, or of free achenes, or compound in a confluent mass of perianths and pericarps. Seed erect, lateral or pendulous; testa membranous; albumen copious, scanty or 0; embryo straight or curved.—Genera about 110. Species about 1500.—Throughout both hemispheres.

A. Trees, sap watery. Flowers usually bisexual or polygamous. Style bifid. Fruit dry
  Leaves entire, serrate in young plants. Cotyledons folded ... HOLOPTELEA.
B. Characters of foregoing group, but fruit a drupe
  1. Male sepals induplicate-valvate. Stipules free .... TREMA.
  2. Male sepals imbricate. Stipules connate, convolute .... GIRONNIERA.
  3. Male sepals imbricate. Stipules free .... CELTIS.
C. Herbs, sap watery. Flowers dioecious. Style bifid. Fruit an achene
  1. A climbing hispid perennial. Leaves opposite .... HUMULUS.
  2. An erect annual. Leaves alternate .... CANNABIS.
D. Trees or shrubs, sap usually milky. Stamens inflexed in bud. Anthers reversed
  1. Male flowers subcapitate. Bracts 2. Female sepals clasping the ovary .... STREBLUS.
  2. Male and female flowers spicate, or female subcapitate. Female sepals fleshy in fruit and enclosing the achene .... MORUS.
E. Trees or shrubs, sap usually milky. Flowers unisexual. Males or all in globose heads or open or closed receptacles
  1. Flowers on the inner wall of the closed receptacle .... FICUS.
  2. Male flowers on a disciform receptacle, female solitary ...... ANTIARIS.
  3. Flowers in globose oblong or cylindric heads. Male monandrous .... ARTOCARPUS.
F. Trees, herbs or shrubs, sap watery. Flowers unisexual. Stamens 1-5. Style undivided or absent
  1. Herbs or shrubs, rarely trees, with stinging hairs
    a. Leaves opposite. Achenes straight. Stigma penicillate ... URTICA.
    b. Leaves alternate. Female sepals 4. Achene oblique. Stigma filiform .... LAPORTEA.
    c. Leaves alternate. Female perianth tubular, 2-3-toothed ... GIRARDINIA.

2. Shrubs or trees, rarely herbs, without stinging hairs
   a. Shrubs or undershrubs. Stigma filiform, persistent .... BOEHMERIA.
   b. Herbs. Flowers 4-merous. Stigma deciduous, filiform ... POUZOLZIA.

Stimulant and rubefacient; diuretic, astringent, and tonic; emollient and laxative; bitter and narcotic; stimulant, diaphoretic, and emetic; acrid and caustic.

Formic acid has been found present in many species of genus *Urtica*. The poisonous glucoside, antiarin, has been isolated from *Antiaris toxicaria* Lesch.; quercitrin occurs in several members.

OFFICIAL : *Cannabis sativa* Linn. (Austria, France, Holland, Japan, Norway, Russia, Switzerland, United States),—var. *indica* Lam. (Belgium, Hungary, Italy, Russia, Spain, Switzerland, Turkey), —var. α & β Linn. (Portugal).

Castilloa elastica Cervant., *C. Markhamiana* Collin. (Spain).

Dorstenia brasiliensis Lamk.=*D. tomentosa* Fisch. & Mey. (Portugal).

Ficus Carica Linn. (Portugal); *F. elastica* Roxb., *F. religiosa* Wild. (Spain).

Humulus Lupulus Linn. (Austria, France, Holland, Italy, Switzerland)=*Lupulus communis* Gaertn. (Portugal).

Liquidambar orientalis Mill. (Austria)=*Platanus orientalis* Pococke, *L. Styraciflua* Linn.=*L. macrophylla* Orst. (Portugal).

Morus nigra Linn. (Belgium, France, Portugal).

Parietaria lusitanica Linn., *P. officinalis* Linn. in Portugal.

Urtica dioica Linn., *U. lusitanica* Brot. (*U. caudata* Vahl), *U. urens* Linn. in Portugal.

HOLOPTELEA Planch.

Deciduous trees. Leaves alternate, distichous, penninerved, entire; stipules lateral, scarious. Flowers polygamous or hermaphrodite, the males without a rudimentary ovary, in fascicles at scars of previous year's shoots which are scaly but leafless. Perianth simple, calycine, 4-8-partite; lobes imbricate, often unequal. Stamens 4-8 (usually 7 or 8); filaments erect, ultimately exserted; anthers hairy. Ovary stipitate, compressed; ovule solitary, pendulous; style short, 2-fid, the arms stigmatic within throughout their whole length.

Fruit dry, indehiscent, samaroid and flat, the nucleus expanded as an obliquely ovate reticulate wing. Seed flat; albumen 0; cotyledons longitudinally complicate; radicle small, superior.—Species 1.—Indo-Malaya.

1. **Holoptelea integrifolia** Planch. in Ann. Sc. Nat. sér. 3, X (1848) 266.—*Ulmus integrifolia* Roxb. Corom. Pl. I (1795) 56, t. 78.—PLATE 885.

A large spreading glabrous deciduous tree 15-18 m. high; bark grey, pustular. Leaves 7.5-12.5 by 3.2-6.3 cm., elliptic, acuminate, glabrous, entire (those of the seedlings and shoots often serrate), base rounded or cordate; main nerves 5-7 pairs; petioles 6-13 mm. long. Flowers usually male and hermaphrodite mixed, in short racemes or fascicles at the scars of fallen leaves. Sepals often 4, pubescent, 1.5-2.5 mm. long. Stamens 4-8 (often 6 or 7); filaments glabrous; anthers pubescent. Ovary compressed, pubescent, 1-celled, stalked, the stalk lengthening as the seed ripens; styles 2.5-4 mm. long, stigmatose on the inside throughout their whole length. Samara nearly orbicular, 2.5 cm. diam., with reticulately veined wings.

Distribution: Sub-Himalayas, Ajmere, Bundelkhand, Bihar, Assam, Burma, W. Peninsula, Ceylon.—Cochin-China.

The tree has a mucilaginous bark, which is boiled, and the juice squeezed out and applied to rheumatic swellings, the exhausted bark is then powdered and applied over the parts covered by the sticky juice.

Almora: Kanju—; *Banda:* Chilla—; *Burma:* Myaukseik, Myaukseit, Pyaukseik—; *Canarese:* Kaladri, Nilavahi, Rahubija, Rasbija, Tapasi, Tapsi—; *Central Provinces:* Karanji, Karinga—; *Ceylon:* Ayil, Kauchia, Velayil—; *Coorg:* Tapasi—; *English:* Indian Elm—; *Garhwal:* Papri—; *Gond:* Karinji—; *Gujerati:* Kanjho—; *Haldwani:* Kanju—; *Hassan:* Kaladri—; *Hindi:* Banchilla, Begana, Bisenda, Chilbil, Chilla, Chillil, Chilmil, Chirbil, Chirmil, Dhamna, Kandru, Kanju, Karanji, Kumba, Kunj, Kunjanali, Papar, Papri—; *Kumaon:* Paparkanju—; *Kurku:* Karanjel—; *Lambadi:* Reniyamboro—; *Lansdowne:* Papri—; *Malayalam:* Aval—; *Marathi:* Papara, Vavla, Vavli, Wavuli, Wawali, Wowoli—; *Mysore:* Tapasi—; *Oudh:* Bisenda, Kunj—; *Porebunder:* Charel—; *Punjab:* Arjan, Kacham,

Khulen, Papri, Rajain—; *Ramnagar:* Papri—; *Reddi:* Pulari—; *Saharanpur:* Banchilla, Kalipapri, Papri—; *Sanskrit:* Chirabilva—; *Sinhalese:* Dadahirilla, Godakirilla—; *Tamil:* Avali, Aya, Kanji, Tabasi, Vellaya—; *Telugu:* Nemali, Nevili, Pedanevili, Tapasi—; *Tulu:* Rahubija—; *Uriya:* Dharango—.

Celtis Tourn.

Trees or shrubs, evergreen or deciduous. Leaves alternate, ovate, entire or serrate, bifarious, base 3-nerved; stipules lateral, free. Flowers small, polygamous, solitary or cymose, the males and androgynous cymes usually at the base of the shoots, the females in the upper axils. Perianth simple. Sepals 4 or 5, imbricate. Petals 0. Stamens 4 or 5, short, erect in bud, inserted round a woolly torus. Ovary sessile; ovule pendulous; style-arms simple or lobed. Fruit a small ovoid or globose drupe; endocarp hard, smooth or rugose. Seeds with membranous testa; albumen scanty or 0; embryo curved; cotyledons broad, inflexed, flat or replicate, surrounding the up-curved radicle.—Species 75.—N. hemisphere, S. Africa.

1. Leaves deciduous .... 1. *C. australis.*
2. Leaves evergreen .... 2. *C. cinnamomea.*

The genus is bitter, tonic, antiperiodic, and antidiarrhoeal.

C. australis Linn. is used medicinally in Europe, *C. occidentalis* Linn. in North America, *C. cinnamomea* Lindl. in Madagascar.

1. **Celtis australis** Linn. Sp. Pl. (1753) 1043.—Plate 886.

A large deciduous tree up to 2.1 m. girth and 30 m. high. Bark pale ashy or grey, smooth with numerous small circular lenticels and occasional horizontal wrinkles, exfoliating in irregular woody pieces. Blaze 6-20 mm., very hard, yellow, thickly mottled and streaked with purplish brown. Young shoots pubescent. Leaves 7.5-15 by 3.8-7.5 cm., ovate or elliptic, caudate-acuminate, base rounded and unequal, coarsely serrate from near the base to the tip, thin, dull green above, glaucescent beneath, glabrous except for a few hairs on the midrib beneath and tufts of hairs in the nerve-axils, main lateral nerves 3-4 pairs including the basal pair. Petiole 7.5-13 mm. long, channelled. Flowers small, greenish.

Perianth-segments ovate, fringed with woolly hairs. Ovary glabrous except in the upper portion where it is narrowed into a short hairy style. Drupe 10-13 mm. long, ellipsoid, purplish black; peduncle 2.5-3.5 cm. long.

Distribution: Salt Range and temperate Himalaya, from Murree to Nepal, 4,000-8,000 ft.—Westwards to Spain.

The fruit is given as a remedy in amenorrhœa and colic (Stewart).

Afghanistan: Tagho, Takhum—; *Almora:* Khark—; *Catalan:* Lladone—; *Dehra Dun:* Kharakchera—; *English:* European Nettle Tree—; *Garhwal:* Kharik—; *Hazara:* Batkar, Batkarar—; *Jaunsar:* Kharak—; *Jhalawan:* Togha—; *Kalat:* Foga—; *Kashmir:* Brimij—; *Kumaon:* Kharak—; *Kunawar:* Ku—; *Nachar:* Ku, Pjaku, Tiku—; *North-Western Himalayas:* Kharak, Kharik, Ku—; *North-Western Provinces:* Kharak, Kharik, Khirk—; *Punjab:* Batkar, Bigni, Bingli, Bingu, Bramji, Brimdu, Brimla, Brimlu, Choku, Kai, Khalk, Kharg, Khark, Khirg, Khirk, Ku, Roku—; *Pushtu:* Taghar, Tughar—; *Sarawan:* Togha—; *Simla:* Kharak—; *Sind:* Tagha—; *Spanish:* Almez, Lodono—.

2. **Celtis cinnamomea** Lindl. in Wall. Cat. 3696.

A tree, 9-12 m.; branchlets tomentose. Leaves 7.5-10 cm., obliquely ovate, long-acuminate, entire crenate or serrate, glabrous, coriaceous, dark green, 3-veined to below the tip, penniveined and reticulate with transverse venules, base acute or rounded; petiole 6-8 mm. Male flowers in short puberulous racemose cymes with slender branches. Female and bisexual, in more slender axillary or terminal cymes. Stamens 5, stigmas linear. Drupe pisiform, narrowed to the obtusely beaked tip.

Distribution: Sikkim Himalaya, Assam, Chittagong, Burma, Ceylon.—Malay Islands.

In Ceylon, the wood scraped fine and mixed with lemon juice is taken internally as a purifier of the blood in itch and other cutaneous eruptions, the body being at the same time anointed with it externally.

The same custom obtains in Madagascar among the Sakalaves

of Majunga and Nossi-Be. They also burn the wood to drive mosquitoes away.

Ceylon: Pudakarpan—; *Dutch:* Stronthout—; *Khond:* Gundu-khambara—; *Majunga:* Afiafy—; *Malayalam:* Putan, Putanon-natu—; *Nossi-Be:* Mantsintay—; *Saora:* Chipuru—; *Sinhalese:* Gurenda, Urenne—; *Tamil:* Pinari—.

Trema Lour.

Shrubs or trees. Leaves alternate, serrate, 3-7-nerved at the base; stipules lateral, caducous. Flowers monoecious, subdioecious, or polygamous, in small axillary cymes. Perianth simple. Male flowers: Sepals 4-5, induplicate-valvate or subimbricate. Petals 0. Stamens 4-5, erect in bud. Pistillode small or 0. Female flowers: Sepals as in the male when stamens are present, flat and subimbricate if stamens 0. Petals 0. Ovary sessile; ovule pendulous; style central with 2 linear arms. Fruit a small straight ovoid or subglobose drupe usually tipped by the style; endocarp hard. Seed small; testa membranous; albumen fleshy; cotyledons narrow; radicle ascending.—Species 30.—Tropical regions.

T. commersonii Blume is used medicinally in Madagascar and La Reunion.

1. **Trema orientalis** Blume Mus. Bot. II (1856) 62.—*Sponia Wightii* Planch. in Ann. Sc. Nat. sér 3, X (1848) 322; Wight Ic. t. 1971.

A fast-growing short-lived tree 7.5-9 m. high with straight spreading branches; branchlets pubescent. Leaves 7-12.5 by 3.2-4.5 cm., obliquely ovate, acuminate, crenate-serrulate, chartaceous, somewhat rough above, clothed beneath with soft often white pubescence, base unequal-sided, rounded or subcordate; lateral basal nerves reaching to half the length of the leaf; petioles 6-10 mm. long. Flowers in axillary pubescent cymes longer than the petiole, the male cymes rather more compact than the female and usually on different trees. Male flowers: Sepals 2.5 mm. long, elliptic-lanceolate. Stamens 5. Pistillode small. Female flowers: Sepals 1.6 mm.

long, elliptic, ciliolate. Ovary sessile; style-arms 1.6 mm. long, villous, slightly incurved. Drupe 4 mm. diam., black when ripe.

Distribution: More or less throughout India, Ceylon, China.—Malay Islands.

The plant is used in epilepsy.

Assam: Amphak, Jigini, Jupong, Opang, Phakram, Sempak, Sapong—; *Badaga:* Home—; *Baigas:* Rukni—; *Bengal:* Chikun, Jiban, Jibon, Jupong—; *Betsileo:* Andraraizina, Andrarezo—; *Bombay:* Gol, Khargul—; *Burma:* Sapchapen—; *Canarese:* Bende, Gorklu, Home, Kadubaja, Kiruhale—; *Central Provinces:* Badumanu—; *English:* Charcoal Tree, Indian Nettle Tree—; *Hova:* Angesoha—; *Kadir:* Ambaratti, Ayalai, Iradai, Ola, Ratti—; *Khond:* Grui—; *Lepcha:* Tugla—; *Malayalam:* Ami, Malantotali, Omi, Pottami, Puni, Ratti—; *Marathi:* Gol—; *Michi:* Param—; *Nepal:* Kuail—; *Sanskrit:* Jivani, Jivanti—; *Sinhalese:* Gedumba—; *Tamil:* Ambaratti, Kuttippala, Mini, Mudalai, Munnai, Oman, Peymunnai, Vendai, Virai—; *Telugu:* Ava, Budumuru, Chakamanu, Gaddanelli, Kakamushti, Morali, Orakanujunaluka, Priyalu—.

GIRONNIERA Gaud.

Unarmed evergreen trees or shrubs. Leaves alternate, penninerved; stipules sheathing the buds, caducous. Flowers dioecious, in axillary cymes or the females solitary. Male flowers minute, globose. Sepals 5, broad, obtuse, imbricate. Stamens 5; filaments erect in bud. Pistillode woolly. Female flowers: Sepals narrower than in the male, acute. Ovary sessile; ovule pendulous; style central with 2 spreading filiform arms. Drupe ovoid or subglobose; endocarp hard. Albumen copious, scanty or 0. Embryo contorted. —Species 8.—Indo-Malaya, Polynesia.

This genus is not therapeutically defined.

1. **Gironniera reticulata** Thwaites Enum. (1861) 268.—PLATE 887B.

A very large tree with butresses at the base; bark grey, smooth; young parts glabrous or sparsely appressedly hairy. Leaves 7.5-12.5 by 3.8-5.7 cm., ovate to ovate-oblong, acuminate or caudate, glabrous,

smooth, shining, base rounded or acute; main nerves 8-12 pairs, conspicuous beneath with reticulate venation between; petioles 6-13 mm. long; stipules connate, lanceolate, hairy, caducous. Flowers axillary, the males in short paniculately branched cymes, the females solitary. Male flowers: Perianth-segments 5, rounded, obtuse. Stamens 5. Pistillode a small tuft of hairs. Female flowers: Sepals narrower than in the male, acute. Ovary glabrous. Drupe ovoid, hardly compressed, stoutly beaked, glabrous, 1.6-2 cm. long (including the beak).

Distribution: Sikkim Himalaya, Assam, Burma, Pegu, W. Peninsula, Ceylon.—Java.

It is taken internally by the Cingalese as an efficacious remedy. When scraped fine and mixed with lemon juice, it is taken internally, as a purifer of the blood in itch and other cutaneous eruptions, the body being at the same time anointed with it externally.

Canarese: Gabbuchakke, Gabbuchekke, Narakabhutale, Narubhutale, Nyal—; *Ceylon:* Strunthont, Urenne—; *Lepcha:* Sheekung—; *Niligiris:* Khomanig—; *Nepal:* Sukar—; *Sinhalese:* Walmunamal—; *Tamil:* Kodaittani—.

Girardinia Gaud.

Herbs or undershrubs with stout stinging hairs. Leaves alternate, 3-nerved, entire or lobed, serrate; stipules connate, foliaceous. Flowers monoecious, in simple or panicled cymes or heads armed with stinging hairs. Perianth simple. Male flowers: Sepals 4-5, valvate. Petals 0. Stamens 4-5, inflexed in bud; filaments free. Pistillode globose or cup-shaped. Female flowers: Perianth tubular, ventricose, 2-3-toothed, at length split on one side, spathaceous. Ovary straight; ovule solitary, erect; stigma subulate, papillose. Fruit a broad compressed achene with thickish pericarp; albumen scanty or 0; cotyledons broad.—Species 6.—Tropical Asia, Africa.

The genus is therapeutically inert.

1. **Girardinia zeylanica** Decne. in Jacq. Voy. (1844) 152. —*G. heterophylla* Decne. var. zeylanica.—*Urtica heterophylla* Wight Ic. t. 687.

A tall robust, perennial-rooted herb, 1.2-1.8 m. high, closely

armed with slender stinging hairs; stem and branches furrowed. Leaves 10-25 cm. long and often as broad, the upper variously lobed and more or less deeply cut though never to the base, more or less pubescent, coarsely serrate, the serratures triangular, sometimes 13 mm. deep, base cordate or truncate; petioles 7.5-18 cm. long, armed with stinging hairs; stipules 13-16 by 8 mm., ovate, cordate, shortly acuminate, 2-fid. Flowers in pedunculate racemose cymes, the males in the lower, the females in the upper axils. Male flowers: Sepals 1.6 mm. long, elliptic, obtuse. Pistillode subglobose, slightly hollowed at the apex. Female flowers: Perianth 2.5 mm. long, 3-lobed at first to less than half way down, afterwards splitting on one side; lobes triangular, acute, hairy. Fruiting cymes short, stout, 2.5-5 cm. long by 2.5-3.2 cm. broad, densely clothed with slender stinging hairs; peduncles rather shorter than the cyme. Achenes 4 mm. long and nearly as broad as long, obliquely ovate, much compressed.

Distribution: Mount Abu, Chota Nagpur, W. Peninsula, Ceylon.

The leaves are used for headache and for swollen joints; a decoction is given in fever.

Assam: Horusurat—; *Bhutia:* Herpa, Serpa—; *Canarese:* Turike—; *English:* Nilghiri Nettle—; *Garhwal:* Jurkunkundalu, Kali, Kubra, Kundalu—; *Hindi:* Alla, Awa, Bichua, Chichr—; *Kumaon:* Awabichchu, Shishuna—; *Lepcha:* Kazu—; *Malayalam:* Anachchoriyanam—; *Marathi:* Motikhajati—; *Nepal:* Ullo—; *Punjab:* Anjan, Bhabar, Ein, Kal, Karla, Keri, Kingi, Sanoli—; *Sinhalese:* Gasskahambilya—; *Telugu:* Gaddanelli—; *Tulu:* Arike—.

Pouzolzia Gaud.

Herbs or undershrubs. Leaves alternate or the lower (rarely all) opposite, usually entire, 3-nerved at the base, smaller upwards, the uppermost often reduced to bracts; stipules free, often persistent. Flowers minute, usually monoecious, in 1-sexual or androgynous clusters sessile in the axils of leaves or bracts, the individual florets pedicellate; bracteoles small. Male flowers: Perianth 4-5- partite or -lobed (rarely 3-partite); lobes valvate with concave or abruptly

inflexed tips and transversely plicate backs. Stamens 4 or 5 (rarely 3). Pistillode clavate or oblong. Female flowers : Perianth tubular, often beaked; mouth contracted, 2-4-toothed. Ovary included; ovule erect; stigma filiform, jointed to the top of the ovary, soon deciduous. Fruit a small achene with brittle shining pericarp, enclosed in but usually free from the marcescent perianth. Seed with membranous testa; albumen very scanty or 0; cotyledons ovate. —Species 40.—Palæotropics.

The genus is not therapeutically defined.

P. hypoleuca Wedd. is used medicinally in Zululand and Mashonaland.

1. **Pouzolzia indica** Gaud. in Freyc. Voy. (1826) 503; Wight Ic. tt. 1980, f. 1; 2100, f. 40.—*P. procumbens* Wight Ic. t. 2099, f. 35.—*P. diffusa* Wight Ic. t. 2099, f. 36.—*Urtica alienata* Linn. Wight Ic. t. 693.

A perennial-rooted herb very variable in size and habit, glabrous, hoary, pubescent or hirsute; stem erect or prostrate, 15-50 cm. long, stout or slender. Leaves opposite or alternate, 2-3.8 by 1-1.6 cm., ovate or ovate-lanceolate, obtuse, acute or acuminate, quite entire, hairy, base acute or rounded; nerves one pair above the 3 basal ones, sparingly branched; petioles 4-20 mm. long; stipules ovate, acuminate, ciliate. Flowers in small axillary androgynous clusters, strigose with simple or hooked hairs. Male flowers: Sepals 4, dorsally rounded, acute. Stamens 4. Pistillode small, clavate. Female flowers: Perianth tubular, persistent, ribbed, 2-fid at the apex, closely investing the achene. Achenes 1.3 mm. long, broadly ovoid, acute, smooth and shining, white with a dark-coloured tip.

Distribution: Throughout India, Ceylon, Malay Islands, China.

The plant is used in syphilis and gonorrhœa.

Tagalog: Tuia—.

HUMULUS Linn.

Perennial, twining, scabrid herbs. Leaves opposite, lobed, palmatinerved; stipules lateral, persistent. Flowers dioecious, males panicled; females in pairs in the axils of the broad bracts of a

catkin-like ovoid spike, bracteate and 2-bracteolate. Male flowers: Sepals 5, imbricate. Stamens 5, adnate to the sepals, erect in bud. Pistillode 0. Female flowers: Sepal, a membranous scale. Ovary sessile, compressed; styles 2, subulate; ovule pendulous, campylotropous. Fruit an ovoid spike of imbricating bracts in the axils of which are 2 flattened achenes each enclosed in its sepal. Albumen scanty or 0; embryo a flat helix.—Species 2.—N. temperate.

H. japonicus Sieb. & Zucc. is used medicinally in China.

OFFICIAL:—The female inflorescence of *H. lupulus* Linn. in Austria, France, Holland, Italy and Switzerland; the fruits of *H. lupulus* Linn. (*Lupulus communis* Gaertn.) in Portugal.

1. **Humulus lupulus** Linn. Sp. Pl. 1028.—PLATE 887A.

Rootstock stout, branched; stems tall, scabrid or prickly with reversed bristles. Leaves 7.5-10 cm. diam., petioled, cordate, toothed, upper ovate, lower 3-5-lobed. Bracts and bracteoles scarious covered with resinous glands. Male flowers 6 mm. diam.; panicles 7.5-12.5 cm. across. Female heads 13 mm. diam., yellow; styles purple; fruiting 3.8 cm. diam., scales orbicular.

Distribution: N.-W. Himalaya. Cultivated.—Native of N. America and perhaps of N. Asia.

Medicinally the Hop is tonic, stomachic, and diuretic, with antiseptic effects; it prevents worms, and allays the disquietude of nervous indigestion. It is generally used in combination with other remedies in debility, indigestion, worms, and nervous conditions. The infusion is a good general tonic and sedative.

Catalan: Boca de llop, Herba de la cerveza, Llupol—; *Danish:* Humle—; *Dutch:* Hoppe—; *English:* Hop—; *French:* Houblon, Houblon a biere, Houblon cultivé, Houblon grimpant, Houblon vulgaire, Salsepareille nationale, Tantaravel, Vigne du Nord—; *German:* Hopfen—; *Hungarian:* Komlo—; *Italian:* Lopolo, Lupolo, Luppolo, Orticacci—; *Persian:* Hymel—; *Polish:* Khmiel—; *Portuguese:* Luparo, Lupulo, Pe de gallo—; *Russian:* Khmel—; *Spanish:* Hombrecillo, Lupulo—; *Swedish:* Humle—.

CANNABIS Tourn.

A tall erect annual herb. Leaves alternate or the lower opposite, upper 1-3-lower 5-11-partite, serrate, palmatinerved; stipules lateral. Flowers small, axillary, dioecious, males fascicled in short pendulous panicles; females crowded under leafy convolute bracts. Male flowers: Sepals 5, imbricate. Stamens 5, erect in bud. Pistillode 0. Female flowers: Perianth hyaline, embracing the ovary or 0. Ovary sessile; style central, arms 2 filiform caducous; ovule pendulous. Achene compressed, crustaceous. Seed flattened, albumen unilateral fleshy; embryo curved, cotyledons broad thick subequal, radicle upcurved incumbent.—Species 1.—Central Asia.

C. sativa Linn. is used medicinally in Europe, China, Indo China, La Reunion, and the M'Zab.

OFFICIAL:—The herb *C. sativa* Linn. (Austria, Holland, Japan, Norway), var. *indica* Lam. (Belgium, Hungary, Italy, Spain, Turkey).

The herb and the fruits of *C. sativa* Linn. (Russia),—var. *indica* Lam. in Switzerland.

The flowering tops of the pistillate plants of *C. sativa* Linn. in France, Great Britain and the United States.

The inflorescence and fruits of *C. sativa* var. and Linn. in Portugal.

1. **Cannabis sativa** Linn. Sp. Pl. (1753) 1027.—PLATE 888.

An annual, smelling, scarcely branched herb of very variable height but usually 0.9-1.5 m. in its feral state, the female plant being generally supposed to grow taller than the male. Leaves 7.5-20 cm. diam., upper 3-1-foliolate passing into bracts, lower 3-8-foliolate with long petioles. Convolute bracts 2 mm. long with oblique mouth much longer than the ovary and its investing hyaline perianth, accrescent and 5 mm. in fruit.

Distribution: Throughout India. Wild in the N.-W. Himalaya.—Central Asia, wild. Cultivated in tropical and temperate regions.

The leaves are bitter, heating; astringent to bowels, tonic, stomachic, alterative; useful in "kapha", leprosy; cause biliousness, intoxication, hallucinations; excessive use causes indigestion, cough, melancholy, impotence, dropsy, insanity.—The inflorescence of the

female plant is stomachic, soporific, abortifacient; useful in convulsions; causes thirst, restlessness, intoxication; dulls pain (Ayurveda).

The leaves have a bitter, sharp, hot, bad taste; tonic, aphrodisiac, antidiarrhœic, intoxicating, soporific; cause thirst and biliousness; water extract anthelmintic; oil good for earache.—The bark is tonic; good for hydrocele, inflammations, piles.—The seeds are carminative, astringent, aphrodisiac; check vomiting, lessen inflammation; cause headache.—The resin is smoked to allay hiccough and bronchitis (Yunani).

Tonic, alterative, emmenagogue, and laxative properties are ascribed to the seeds by the Chinese.

Sudborough and Padubidri Ganesh Rao have elaborated tests for Ganja and other products from Indian Hemp (*Journ. Ind. Inst. Sc.*, 1918).

Annam: Dai ma—; *Arabic:* Hinab, Kanab, Kinnab, Nabatulqunnab—; *Bengal:* Bhang, Ganja, Sidhi—; *Burma:* Ben, Bhenbin, Bin, Sechaub, Sejavbin—; *Canarese:* Bhangi, Bhangigida—; *Canton:* Fu ma—; *Catalan:* Canam, Canem—; *Celtic:* Kanas—; *Central Provinces:* Ganja—; *Chinese:* Fu Ma, Ma, Ta Ma, Tang Ma—; *Cutch:* Ganja—; *Deccan:* Ganja, Sidhi—; *Dutch:* Hennip, Indische hennepkruid, Kennip—; *English:* Hemp—; *French:* Canabier, Canabon, Candi, Caneba, Cannab, Chambrie, Chamurt, Chanvre, Chanvre indien, Chauvenon, Chenèves, Cherbe, Haschisch, Herbe aux fakirs—; *German:* Hanf, Indischer Hanf—; *Greek:* Kannabis—; *Gujerati:* Bhang, Ganja—; *Hindi:* Bhang, Charas, Ganja, Ganjekaper, Gur, Kinnab, Phulganja, Sabzi, Siddhi—; *Hova:* Rongonilahy, Rongony—; *Hungarian:* Indiai Kender—; *Italian:* Canapa, Canape, Canape indiana—; *Jhal:* Bhang—; *Kashgar:* Kandir—; *Kashmir:* Bangi—; *Konkani:* Bhang—; *Languedoc:* Carbé, Carvé—; *La Reunion:* Amale, Gandia—; *Madagascar:* Jea, Soroma—; *Malaya:* Foh mah—; *Malayalam:* Cherukanchava, Ginjilachilachi, Kanchavachetto—; *Marathi:* Bhang, Bhangachajhada—; *Mexican:* Marihuana—; *Morocco:* Hatchis—; *Mundari:* Ganja—; *M'Zab:* Kif—; *North-West Provinces:* Bhang, Charas, Ganja, Sabji—; *Norwegian:* Hampefro—; *Persian:* Bang, Daraktebang, Darakhtekinnab, Nabatulqunnab—; *Polish:* Konop—;

Portuguese: Canamo, Canhamo, Canhamo ordinario, Linho canhamo—; *Provencal:* Canebe, Carbe—; *Punjab:* Bengi, Bhang, Bhangi, Charas, Kas, Sabzi—; *Roumanian:* Canipa—; *Russian:* Konaplya—; *Sadani:* Ganja—; *Sanskrit:* Ajaya, Ananda, Bhanga, Bhringi, Chapala, Dhurtapatni, Dhurtavadhu, Ganja, Ganjika, Hanga, Hara, Harshini, Indrashana, Jaya, Jnanavallika, Kamagni, Manohara, Matkunari, Matta, Matulani, Matuli, Maya, Mohini, Nili, Shakrashana, Shiva, Shivapriya, Tandraruchivardhini, Trailokhyavijaya, Ujaya, Unmattini, Ununda, Vajradruvikshaha, Vijaya, Virapatra, Vrijpatta, Yogini—; *Sinhalese:* Ganjagaha, Kansagaha, Matkansha—; *Spanish:* Bangue de la India, Canamo, Canamo indiano—; *Swedish:* Hampa—; *Tamil:* Bangi, Ganja, Kalpam, Korkkarmuli—; *Telugu:* Bangiaku, Ganjachettu, Kalpamchettu—; *Turkish:* Hint Keneviri—; *Zulu:* inTsanga—.

Streblus Lour.

Unarmed shrubs or trees with milky juice. Leaves alternate, penninerved, scabrous; stipules small, lanceolate. Flowers axillary, usually dioecious, the males in pedunculate heads or spikes; female flowers pedicellate, bracteate, solitary or 2-4 together. Male flowers : Sepals 4, imbricate. Stamens 4, inflexed in bud. Pistillode dilated at the top. Female flowers: Sepals 4, imbricate, embracing the ovary. Ovary straight, retuse; ovule pendulous; style central with very long arms. Fruit membranous, straight, subglobose, laxly covered by the persistent perianth. Seed globose; testa membranous; albumen 0; embryo globose; one cotyledon very large, embracing the smaller and the ascending radicle.—Species 1.—Indo-Malaya.

1. **Streblus asper** Lour. Fl. Cochin-China II (1790) 615.—*Epicarpurus orientalis* Bl.; Wight Ic. t. 1961.—Plate 889.

A small rigid gnarled evergreen tree; bark light-grey or greenish with faint ridges, rough when old; juice milky; twigs hairy, scabrid. Leaves alternate, 2.5-10 cm. long, rhomboid-elliptic, obovate or elliptic-oblong, acute or shortly abruptly acuminate, more or less sinuate or crenate, scabrid on both surfaces but especially beneath; lateral nerves 4-6 pairs; prominent beneath, joined by intra-marginal

loops; petiole 1.3-3.8 mm. long; stipules rather longer than the petiole, obliquely lanceolate, acuminate. Flowers dioecious, axillary. Male flowers in globose pedunculate heads 7.5 mm. diam.; peduncles 1-4 together, 7.5-13 mm. long. Perianth campanulate, sepals 4, pubescent outside, imbricate in bud. Stamens 4, inflexed in bud, anthers reniform. Female flowers solitary, inconspicuous, long peduncled; peduncles 1-4 together, 5-13 mm. long; bracts 2-3 below the perianth. Perianth closely embracing the ovary, sepals 4, enlarged in fruit. Ovary 1-celled; ovule pendulous; styles 2, very long, filiform, connate at the base. Fruit a 1-seeded berry, loosely enclosed by the enlarged sepals, yellow when ripe, 5 mm. diam.

Distribution: Drier parts of India, Ceylon.—Malay Islands, Cochin-China, China, Siam.

The plant is useful in leprosy, piles, "vata" and "kapha", diarrhœa, dysentery, elephantiasis, tuberculous glands (Ayurveda).

The milky juice has astringent and antiseptic qualities, and is applied to sore heels and chapped hands. The bark in decoction is given in fevers, dysentery and diarrhœa. The roots are used as an application to unhealthy ulcers and sinuses. They are said to be an antidote to snake-poison.

The fresh roots are *erroneously* believed to be an antidote to snake-venom (Mhaskar and Caius).

Bengal: Sheora, Syaora—; *Bombay:* Karaoli, Karchanna, Karera, Karvati, Rusa—; *Burma:* Okhne, Opnai—; *Canarese:* Mitala, Mitle, Mitli, Mittelgida, Ponalige, Punje, Timil—; *Ceylon:* Patpiray, Pirasu—; *Gond:* Karasni—; *Hindi:* Daheya, Dahia, Karchanna, Rusa, Sahora, Siora—; *Kolami:* Harasaijung—; *Koya:* Bamigi—; *Magahi:* Ungnai—; *Malayalam:* Paruva, Tintapparuva—; *Marathi:* Karera, Kharaoli, Kharota, Paraya, Parayu, Poi—; *Nepal:* Kakshi—; *North-Western Provinces:* Rusa, Sihora—; *Patna:* Sehora—; *Punjab:* Dahya, Jindi—; *Saharanpur:* Dahiakurchna—; *Sanskrit:* Akshadhara, Bhutavasa, Bhutavriksha, Dhukavasa, Gavakshi, Karkashachhada, Kaushikyoja, Kharachhada, Kshiranasha, Pishachandru, Pitaphala, Pitaphalaka, Rukshapatra, Sakata, Shakhota, Shakhotaka, Shankhinivasa—; *Santali:* Sahra—; *Sinhalese:* Getanetul—; *Tamil:* Kurripila,

Kuttippirai, Parayan, Pasuna, Pira, Piray, Piraya, Pukki, Vittil—; *Telugu:* Barinika, Kakkabedi, Paki, Sitanike—; *Uriya:* Sahada—.

MORUS Linn.

Trees or shrubs. Leaves alternate, ovate, often lobed, 3-nerved; stipules lateral, lanceolate, deciduous. Flowers monoecious or dioecious. Male flowers in catkin-like spikes; sepals 4, imbricate; stamens 4, inflexed in bud; pistillode minute. Female flowers in cylindric spikes or ovoid heads; sepals 4, accrescent and succulent in fruit; ovary 1-celled; ovule pendulous; styles 2, free or connate. Fruit a spike or head of achenes each enclosed in the succulent perianth, the whole forming a compound berry (mulberry).—Species 12.—N. temperate.

1. Leaves ovate or broadly ovate, caudate, sharply serrate, often deeply lobed .... 1. *M. indica.*
2. Leaves ovate-obtuse, acute or sharply acuminate, serrate or crenate-serrate, basal nerves 3 .... 2. *M. alba.*
3. Leaves broader than in *alba*, firm, thick, 5-nerved .... 3. *M. nigra.*

Root vermifuge; bark cathartic and anthelmintic; fruit cooling and laxative.

The following are used medicinally in Spain—*M. alba* Linn., *M. multicaulis* Linn., *M. nigra* Linn.—; in China and Indo China—*M. alba* Linn.—; in Persia and La Reunion—*M. alba* Linn., *M. nigra* Linn.—.

OFFICIAL:—The fruit of *M. nigra* Linn. in Belgium, France, and Portugal.

1. **Morus indica** Linn. Sp. Pl. (1753) 986; Wight Ic t. 674. —PLATE 890.

A shrub or small tree up to 7.5 m. high with ovate or broadly ovate, caudate, sharply serrate, often deeply lobed leaves 5-12.5 cm. long. Flowers with young leaves. Male spikes rather lax-flowered broadly cylindric or ovoid 1.3-3.8 cm. long, hairy all over, pedicels short, sepals elliptic 2-2.5 mm. long, stamens twice as long. Female spikes short-ovoid on slender peduncles about half as long, sepals

obovate with white margins, styles long, connate below, hairy. Fruit ovoid or subglobose, red, then black.

Distribution: Wild in the sub-Himalayan tract from the Sutlej eastwards, up to 5,000 ft. Cultivated elsewhere.

The fruit is acrid, sweetish, sour; cooling, laxative; useful in "vata" and "kapha", biliousness, burning sensations (Ayurveda).

The leaves are good for sore throat, scabies.—The fruit is sour, sweet, with a flavour; tonic, aphrodisiac, fattening, diuretic, anthelmintic; enriches the blood and betters the appetite; good for brain, heart, spleen; useful in small-pox and throat troubles, lumbago, diarrhœa, ulcerated intestines.—The root is purgative.—The seeds heal cracks in the sole of the foot (Yunani).

The fruit has an agreeable, aromatic and acid flavour, is cooling and laxative, allays thirst, and is grateful in fevers.

The bark is supposed to be vermifuge and purgative.

The root is considered anthelmintic and astringent.

A decoction of the leaves is used as a gargle in inflammation and thickening of the vocal cords.

Arabic: Tut, Tutebanti, Tutetaras—; *Assam:* Bola, Nuni—; *Bengal:* Tut—; *Bhutia:* Singtok—; *Bombay:* Ambor, Setur, Tulaambor, Tut, Tutri—; *Burma:* Posa—; *Canarese:* Brahmadaru, Hippalinerale, Hile, Kambali, Kambli, Korihannu, Rasame, Reshme—; *Deccan:* Tut—; *Gujerati:* Shetur—; *Hindi:* Siahtut, Tut, Tutri—; *Hova:* Vorihazo—; *Konkani:* Amor—; *Lepcha:* Mekrap, Nambyong—; *Malayalam:* Brahmanyam, Cherukamuka, Tankannakam, Tulam, Yusham—; *Marathi:* Ambat, Tut—; *Nepal:* Chhotakimbu, Sanukimbu, Kimbu—; *North-West Provinces:* Shahtut, Tut, Tutri—; *Persian:* Shihatuta, Tut, Tuteshirin, Tutetursh—; *Portuguese:* Amora—; *Punjab:* Karan, Tut, Tutri—; *Sanskrit:* Brahmadaru, Brahmakashtha, Brahmaneshta, Brahmanya, Kramuka, Madasdra, Madhupippali, Mridupippali, Mridusara, Nilarangaka, Nilavrintaka, Palashika, Puna, Pusha, Shalmali, Supushpa, Surupa, Tuda, Tula, Tuta, Yusha—; *Sind:* Jokul, Tut—; *Tamil:* Kamalapputtiri, Kambali, Kambalikkondan, Kambalippuchijedi, Musukkattai, Sadini, Tippilinaval—; *Telugu:* Putika—; *Urdu:* Shahetuta, Shatuttursh—; *Uriya:* Tuto—.

2. **Morus alba** Linn. Sp. Pl. (1753) 986.—PLATE 891A.

A medium sized deciduous tree; bark of large stems brown, rough, fissures mostly vertical. Leaves very variable in size and shape, usually 5-7.5 cm. long, ovate, obtuse, acute or shortly acuminate, serrate or crenate-serrate, base cordate or truncate, slightly pubescent along the nerves beneath, in young plants and on vigorous shoots usually lobed, basal nerves 3, lateral nerves forked near the margin; petiole usually 1.8-2.5 cm. long. Flowers greenish, the sexes often on different branches occasionally on different trees. Male spikes 1.3-3.8 cm. long, puberulous, flowers minutely pedicellate, not crowded. Sepals 2.5 mm. long, hairy. Female spikes ovoid, pedunculate, the peduncle as long as the spike; sepals 4, glabrous or shortly ciliate; style-arms glabrous or nearly so, free to the base. Fruit up to 2.5 cm. long, usually less, ovoid, white or nearly black when ripe, the latter form red when not fully ripe.

Distribution: Commonly cultivated in Baluchistan, Afghanistan and the northern part of the Trans-Indus territory, also in the Punjab, Kashmir and the N.-W. Himalaya.

The therapeutic properties are the same as those of *M. indica* (Ayurveda).

The sweet, deep-red juice of the white or red form of the fruit is used for sore-throat, and acts as a pleasant refrigerant in cases of fever. The fruit is employed, by *hakims*, as remedy for sore-throat, dyspepsia and melancholia. The bark is considered purgative and anthelmintic.

In China, the root bark is considered a restorative, tonic, and astringent remedy chiefly in nervous disorders.

Annam: Cay giau tau, Tang bach bi—; *Arabic:* Tuth, Tut—; *Bombay:* Chinni, Satur, Shahtut, Tut, Tutla—; *Canarese:* Uppunute—; *Catalan:* Morera blanca, Morera de la seda—; *Chinese:* Sang—; *Dehra Dun:* Tuntri, Tutri—; *English:* Mulberry, White Mulberry—; *French:* Amomie, Murier blanc, Murier du ver à soie—; *Hindi:* Chinni, Chun, Tul, Tulklu, Tunt, Tut, Tutri—; *Hova:* Hazondandy—; *Italian:* Gelsemoro—; *Jhalawan:* Nartut, Wadatut—; *Kalat:* Tut—; *Kotra:* Tut—; *Languedoc:* Amourié—; *La Reunion:* Murier blanc—; *Persian:* Tuth, Tut—; *Philippines:* Moral, Moras—; *Pishin-Quetta:* Khartut, Tutbur, Tutkishmishmi—;

Punjab: Tut—; *Sanskrit:* Tula—; *Seychelles:* Murier—; *Spanish:* Moral blanco, Morera—; *Tamil:* Pattuppuchi—; *Uriya:* Tuticoli—; *Wad:* Tut—.

3. **Morus nigra** Linn. Sp. Pl. (1753) 986.—Plate 891B.

Leaves broader than in *M. alba*, firm, thick, 5-nerved. Sepals and styles densely hairy. Fruit purple.

Distribution: Cultivated in Baluchistan.

The fruit is nutritive, refrigerant, and laxative. The juice forms a grateful drink for convalescence from febrile diseases, as it checks the thirst and cools the blood.

The bark is purgative and vermifuge.

In Cambodia, the leaves are used in conjunctivitis.

Baluchistan: Shahtut—; *Cambodia:* Mon—; *Catalan:* Morera negra—; *Dutch:* Moerbezieboom—; *English:* Black Mulberry Tree, Common Mulberry, Mulberry—; *French:* Meurier, Murier, Murier noir—; *German:* Maulbeerbaum—; *Languedoc:* Amourié—; *Portuguese:* Amoreira, Amoreira negra—; *Roumanian:* Agud, Dud—; *Russian:* Tchelkovitsa, Tutovoi drava—; *Spanish:* Moral—.

Ficus Linn.

Trees or shrubs sometimes scandent or epiphytic (at least primarily); juice milky. Leaves alternate (rarely opposite), entire, lobed, serrate or toothed; stipules clothing the bud, caducous. Flowers minute, 1-sexual, monoecious (very rarely dioecious) on the inner walls of a fleshy receptacle the mouth of which is closed by imbricate bracts; florets often mixed with bracteoles, of four forms, male, female, gall and (rarely) neuter; receptacles usually androgynous, the males nearest the mouth; males, females, and galls may occur in the same receptacle, or males and galls may be in one set, females and neuters or males and galls in one set, females only in another. Male flowers: Perianth 2-6 -fid or -partite. Stamens 1 or 2 (rarely 3-6), erect in bud. Neuter flowers: Perianth as in the male. Female flowers: Perianth as in the male or imperfect or obsolete. Ovary straight or oblique; ovule pendulous; style eccentric; stigma entire or 2-armed, acute or obtuse. Gall flowers: Perianth

as in the female. Ovary containing the pupa of a hymenopterous insect; style short, often dilated upwards. Fruit an enlarged hollow cup-shaped closed receptacle, the inner wall studded with crustaceous or fleshy achenes. Seed pendulous; testa membranous; albumen scanty; embryo curved; cotyledons equal or unequal; radicle ascending.—Species 800.—Tropics.

A. Pseudohermaphrodite .... 1. *F. gibbosa.*
B. Unisexual or asexual
  I. Leaves coriaceous or subcoriaceous
    a. Leaves more or less tomentose
      1. Leaves obtuse. Receptacles puberulous, globose, red, 2 cm. diam. .... 2. *F. bengalensis.*
      2. Leaves elliptic or broadly ovate, acute .... 17. *F. dalhousiae.*
    b. Leaves glabrous ..
      1. Receptacles sessile, globose or ovoid, blood-red when ripe. Basal bracts rounded .... 3. *F. benjamina.*
      2. Receptacles yellow or reddish, 8 mm. diam. Basal bracts blunt. Petioles 6-13 mm. long .... 4. *F. retusa.*
      3. Receptacles greenish yellow, dotted, 6 mm. diam. Basal bracts acute. Petioles 2-2.5 cm. long .... 18. *F. talboti.*
  II. Leaves subcoriaceous or membranous, on long slender petioles
    a. Apices of leaves more or less caudate-acuminate
      1. Bases of leaves slightly narrowed to the petiole, 5-nerved. Receptacles not depressed at the apex 5. *F. rumphii.*
      2. Bases of leaves not narrowed to the petiole, 5-7-nerved. Receptacles depressed at the apex .. 6. *F. religiosa.*
      3. Bases of leaves cordate, apex shortly caudate-acuminate .... 16. *F. arnattiana.*
    b. Apices of leaves not caudate-acuminate. Receptacle sessile, in pairs, axillary. Stamen 1.
      1. Primary nerves of leaves indistinct. Male perianth of 3 sepals .... 19. *F. tsiela.*
      2. Primary nerves of leaves distinct. Male perianth of 4 or 5 sepals .... 7. *F. lacor.*
C. Unisexual
  I. Male flowers with 1 stamen
    a. Receptacles axillary, solitary. Basal bracts minute or absent
      1. A creeping shrub. Bracts minute, basal or high up on the peduncle .... 8. *F. heterophylla.*
      2. An erect shrub. Basal bracts absent .... 9. *F. asperrima.*
    b. Receptacles in some individuals all axillary, in other all on branches from the stem near the root, in others occupying both situations. Basal bracts 3 .... 10. *F. hispida.*
    c. Receptacles in pairs or clusters on scaly usually leafless branches. Basal bracts 3 .... 11. *F. cunia.*

d. Receptacles on long leafless branches from the base of the stem. Bracts 5, broad .... 12. *F. ribes.*

II. Male flowers with 2 stamens

Receptacles pedunculate, all in fascicles from the stem or branches. Basal bracts 3 .... 14. *F. glomerata.*

III. Male flowers with 3-6 stamens

a. Receptacles supported by 3 or more acute deciduous basal bracts .... 13. *F. palmata.*

b. Resembles *palmata* very closely; the receptacles of both sexes lengthen out into a stalk .... 15. *F. carica.*

Bark tonic, astringent; leaves emetic; ripe fruit pectoral and demulcent; milky juice tonic, may be extremely poisonous.

The following species are used medicinally in Europe—*F. carica* Linn.—; in Egypt—*F. sycomorus* Linn.—; in China—*F. carica* Linn., *F. pumila* Linn., *F. retusa* Linn.—; in Tongking—*F. pumila* Linn.—; in Malaya—*F. retusa* Linn.—; in Brazil—*F. anthelmintica* Mart., *F. doliaria* Mart.—; in Guinea—*F. rugosa* G. Don., *F. sycomorus* Linn., *F. vogelii* Miq.—; in La Reunion—*F. lateriflora* Vahl, *F. rubra* Vahl, *F. terebrata* Willd.—; in Madagascar—*F. apodocephala* Baker, *F. baroni* Baker, *F. melleri* Baker, *F. rubra* Vahl, *F. terebrata* Willd., *F. trichopoda* Baker, *F. trichosphaera* Baker—.

OFFICIAL:—The latex of *F. elastica* Roxb. and *F. religiosa* Wild. in Spain.

The dried fruits of *F. Carica* Linn. in Portugal.

1. **Ficus gibbosa** Bl. Bijdr. (1825) 466.—*F. tuberculata* Roxb.; Wight Ic. t. 651.—PLATE 892.

A small, at times a large tree, often epiphytic or climbing, enclosing the trunks of trees in a perfect network of branches, or creeping along walls and on the sides of wells. Leaves thinly coriaceous, smooth above, rough beneath, elliptic, more or less acuminate, often very unequal-sided, angular and with a few large teeth, blade 7.5-15 cm., petioles 6 mm., secondary nerves 4-6 pairs, joined by arching intra-marginal veins, the lowest pair from the base usually running near the edge, intermediate and tertiary nerves distinct. Receptacles minutely hairy, 6-8 mm. diam., peduncle up to 8 mm. long, bracts at base of peduncle. Ovary in fertile flowers sessile. Fruit yellow when ripe.

Distribution: Sub-Himalayan tract from the Jumna eastwards Assam, Chittagong, Andamans, Lower Burma, Bihar, Chota Nagpur, Central Provinces, W. Peninsula, Ceylon, Malay Peninsula.—Malay Archipelago, China.

The decoction of the root acts as a powerful aperient. The root-bark is stomachic and gently aperient.

Bombay: Datir—; *Burma:* Nyaungthabye—; *Canarese:* Goddumitle, Goddumitli, Kajjigoli, Mitle—; *Dehra Dun:* Chhanchri, Dadubande—; *Garhwal:* Chanchri—; *Gujerati:* Umbar—; *Jabalpur:* Majni—; *Khond:* Baseri, Kaseri—; *Lambadi:* Sodaro—; *Malayalam:* Attimiral, Itti, Kallitti, Kuruval—; *Marathi:* Datiri, Datri, Umbar—; *Mundari:* Gurihera, Kakasadaru, Kakasahesa—; *Reddi:* Karasa—; *Sanskrit:* Udumbar—; *Saora:* Karasa—; *Satpura:* Chirwal—; *Tamil:* Alvanangi, Iradagam, Irali, Iratti, Itti, Kallichi, Kallitti, Kattichi, Kuruvaru, Suvadagandi—; *Telugu:* Kappa, Kondajuvvi, Pindi, Tellabarinika—; *Uriya:* Korotosani—.

2. **Ficus bengalensis** Linn. Hort. Cliff. (1737) 471, no. 4, and Sp. Pl. (1753) 1059.—*Urostigma bengalense* Gasp.; Wight Ic. t. 1989.—PLATE 893.

A very large tree reaching 30 m. high, sending down many aerial roots from the branches and thus extending the growth of the tree indefinitely; young parts softly pubescent. Leaves coriaceous, 10-20 by 5-12.5 cm., ovate or orbicular-ovate to elliptic, obtuse, entire, glabrescent above, glabrous or minutely pubescent beneath, base rounded or subcordate, 3-7-nerved with about 5-7 pairs of lateral nerves above the basal ones and distinct reticulate venation between; peduncles 1.3-5 cm. long, stout; stipules 2-2.5 cm. long, coriaceous. Receptacles about 2 cm. diam., sessile in pairs, axillary, globose, puberulous, red when ripe, with 3 broad rounded nearly glabrous coriaceous basal bracts. Male flowers rather numerous near the mouth of the receptacles. Sepals 4, lanceolate. Stamen 1. Gall flowers : Perianth as in the male. Style short. Fertile flowers : Perianth shorter than in the male. Style elongate.

Distribution: Sub-Himalayan tract and W. Peninsula, planted elsewhere.

All parts of the plant are acrid, sweetish; astringent to the bowels; useful in "kapha", biliousness, ulcers, erysipelas, vomiting,

vaginal complaints, fever, inflammations.—The leaves are good for ulcers; the young leaves for leprosy (Ayurveda).

The milky juice is aphrodisiac, tonic, vulnerary, maturant; lessens inflammation; useful in piles, diseases of the nose, gonorrhœa. —The aerial root is styptic, aphrodisiac; useful in gonorrhœa, syphilis, biliousness, dysentery, inflammation of the liver.—The leaves are vulnerary; useful in biliousness (Yunani).

The milky juice is externally applied for pains and bruises and in rheumatism and lumbago. It is considered as a valuable application to the soles of the feet when cracked or inflamed, and is also applied to the teeth and gums as a remedy for toothache.

An infusion of the bark is supposed to be a powerful tonic and is considered to have specific properties in the treatment of diabetes. The seeds are deemed cooling and tonic. The leaves are applied, heated as a poultice, to abscesses, and after they have turned yellow are given with roasted rice in decoction as a diaphoretic. The root fibres are given in gonorrhoea in the Punjab, being considered by Vaidas to resemble Sarsaparilla. An infusion of the small branches is useful in haemoptysis. The tender ends of the hanging roots are given for obstinate vomiting.

The bark and sprouts are not an antidote to snake-venom (Mhaskar and Caius).

Arabic: Jhatulejaibva—; *Assam:* Bot—; *Bengal:* Bar, Bot, But—; *Burma:* Pyinyaung, Pyinyoung—; *Canarese:* Al, Ala, Alada, Goli, Nyagrodha, Vata—; *Ceylon:* Al—; *English:* Banyan Tree—; *French:* Arbre des Banians, Arbre des pagodes, Figuier due Bengale—; *Garo:* Ranket—; *Gond:* Barelli—; *Gujerati:* Vad, Vadlo, Vor—; *Hazara:* Phagwari—; *Hindi:* Bar, Bargad, Bargat, Ber, Bor—; *Kolami:* Bai, Boi—; *Konkani:* Vad, Vhad—; *Kumaon:* Bar, Bargat—; *Lepcha:* Kanji—; *Makran:* Zardkalagi—; *Malaya:* Bor; *Malayalam:* Ala, Nyagrodham, Peral, Peralin, Peralu, Vatam—; *Marathi:* Vada, Wad, War—; *Mundari:* Baredaru, Baridaru—; *Nepal:* Bar, Barahar, Borhar—; *North-West Provinces:* Kurku, Wora—; *Persian:* Darakhteresha—; *Portuguese:* Arvore de gralha, Arvore de raizes, Figueira de Bengala—; *Punjab:* Bargad, Bera, Bohar, Bohir, Bor—; *Pushtu:* Baagat, Bar—; *Rindli:* Bar—;

Sadani: Bar—; *Sanskrit:* Avaroha, Bahupada, Bahupadi, Bhandira, Bhringi, Chira, Dhruva, Jatala, Jatiljati, Karmaja, Kshiri, Mahachhaya, Mana, Mandali, Nandi, Nila, Nyagrodha, Padarohona, Patanga, Raktaphala, Rohina, Shipharuha, Shungi, Skandhaja, Skandhajanya, Skandharuha, Vaishravanavas, Vaishravanodaya, Vanaspati, Vata, Vitapi, Vrikshanath, Yakshataru, Yakshavas, Yamapriya—; *Santal:* Bare—; *Sind:* Bur, Wur—; *Sinhalese:* Mahanuga—; *Tamil:* Al, Ala, Alam, Eguvasam, Ka, Kadavam, Kagavasugam, Kan, Kavasugam, Koli, Vekkurodam, Pali, Palu, Peral, Pudam, Pudavam, Pudavirujam, Ton, Vadam, Vadavirukkam—; *Telugu:* Bhandiramu, Mari, Matti, Peddamatti, Peddimari, Rohi, Vati, Vitapi, Vrikshadanamu—; *Tulu:* Goli—; *Urdu:* Bargoda—; *Uriya:* Boro, Boto—.

3. **Ficus benjamina** Linn. Mant. 129.—PLATE 894.

An evergreen tree with a dense divaricate crown and pendulous branches, all parts glabrous; stipules small, lanceolate, glabrous. Leaves ovate to elliptically ovate, on a slender petiole 10-17 mm. long, obtuse at the base, rather long and bluntish acuminate, 5-9 cm. long, rigidly chartaceous, entire, glabrous, the nerves thin, much crowded and uniting near the margin, all parallel with a transverse net-venation between, prominent on both sides. Receptacles sessile, by pairs or solitary in the axils of the leaves, globular or almost obovate and narrowed at the base, varying in size from 8 mm. to nearly 2 cm. diam., blood-red when fully ripe, glabrous, 3-bracted, the bracts broad, but short, rounded, glabrous.

Distribution: Foot of E. Himalaya, Assam, Chittagong, Andamans, Pegu, Martaban, Tenasserim, Chota Nagpur, N. Circars, Travancore.—Malay Archipelago and China.

In Malabar, a decoction of the leaves mixed with oil is applied to ulcers.

The milky juice is used against whitening of the cornea by the Mundas of Chota Nagpur. When a baby's eyes get white, they mix some of the juice with the mother's milk and instil about two drops of this mixture in its eyes.

Assam: Chilubor, Juripakri—; *Bengal:* Pakur—; *Bombay:* Pimpri—; *Burma:* Nyaungthabieh—; *Chota Nagpur:* Jili—;

English: Java Fig, Java Willow—; *Lepcha:* Kunhip, Yokshee—; *Malay:* Beringan, Waringan—; *Malayalam:* Jili, Vellal—; *Mundari:* Duahesa—; *Nepal:* Kabra—; *Sadani:* Duruapakair, Sonpakair—; *Santali:* Sunonijar—; *Telugu:* Kondagolugu, Kondajuvvi, Putrajuvvi—; *Uriya:* Jodi—.

4. **Ficus retusa** Linn. Mant. (1767) 129.—Plate 895.

A moderate sized shady tree, all parts glabrous; aerial roots usually few, sometimes absent. Leaves coriaceous, 5-10 cm. long and nearly as broad, elliptic, ovate or obovate, rounded or shortly and bluntly acuminate at the apex, polished and shining, base narrowed into the petiole, 3-nerved, with 5-6 pairs of main lateral nerves above the basal ones, not more prominent than the secondary nerves, reticulately veined between; petioles 6-13 mm. long; stipules lanceolate, 10 mm. long. Receptacles small, about 8 mm. diam., sessile in pairs, axillary or from the scars of fallen leaves, depressed-globose, smooth, yellow or reddish when ripe; basal bracts 3, broadly ovate, blunt, spreading, persistent. Male flowers numerous, scattered, sessile or shortly pedicellate. Sepals 3, subspathulate. Stamen 1; filament as long as the cordate apiculate anther. Gall flowers sessile or pedicellate. Sepals 3, oblong or broadly spathulate. Style short. Fertile flowers usually sessile. Sepals 3, much shorter than in the gall flowers. Style short; stigma cylindric or clavate. Achenes ovoid or obovoid.

Distribution: Chota Nagpur, Bihar, Central India, W. Peninsula, S. India to Ceylon, Sundribuns, Andamans.—Malay Islands, Australia.

All parts are pungent, bitter; tonic, aphrodisiac; useful in burning sensations, leucoderma, "tridosha", ulcers, leprosy, itching, biliousness, diseases of the blood (Ayurveda).

The bark of the root itself, and the leaves boiled in oil form good applications for wounds and bruises.

In rheumatic headache, the leaves and bark pounded are applied as a poultice. In flatulent colic, the following prescription is used in the Konkan :—Take of Nandruk leaf juice, Tulsi leaf juice, and *ghi* equal parts; boil until all the water has evaporated; do this again 21 times with fresh quantities of the juice of the two plants;

the residuum may then be applied to the belly, and fomentation with hot brick be practised. The juice of the bark has a reputation in liver disease; dose 1 tola in milk.

In China, the aerial rootlets are considered to be a sovereign remedy for the toothache. For this purpose they are mixed with salt, thoroughly dried up and powdered, and applied to the decayed or aching tooth.

Bengal: Kamrup, Zir—; *Bombay:* Nandruk, Pilala—; *Burma:* Nyaungok, Nyaungthabyeh—; *Canarese:* Hillala, Hinala, Kirugoli, Pilal, Pilala, Pilimara, Pinala, Pinval—; *Ceylon:* Itti—; *Chinese:* Yung Shu Hsu—; *Chota Nagpur:* Jili—; *Hindi:* Kamrup, Pinwal, Zir—; *Khond:* Burdungi—; *Kolami:* Butisa—; *Kumaon:* Ajan, Barri—; *Lambadi:* Nankipipri—; *Lepcha:* Sitnyok—; *Malay:* Ara jejawi—; *Malaya:* Jili, Yoong see soo—; *Malayalam:* Ittiyal, Kalatthi—; *Marathi:* Nandruk, Tunivriksha—; *Mundari:* Buruhesa, Butihesa, Cumanhesa—; *Nepal:* Jamu—; *Sadani:* Nabhipakair, Tannggrapakair—; *Sanskrit:* Kantalaka, Kshudra, Kuberaka, Kuni, Mandirriksha, Tunna—; *Santali:* Sunumjon—; *Saora:* Nandireka—; *Sinhalese:* Panunuga—; *Tamil:* Ichi, Kallichi, Malaiyitchi—; *Telugu:* Billajuvvi, Hemantu, Hemavudaya, Hemodaga, Kondapillara, Nandireka, Vettijuvvi, Yerrajuvvi—; *Tulu:* Sidigoli—.

5. **Ficus rumphii** Bl. Bijdr. (1825) 437.—*F. cordifolia* Roxb.; Wight Ic. t. 640.—PLATE 896B.

A moderate sized deciduous tree at first usually epiphytic, all parts glabrous. Leaves subcoriaceous, 7.5-15 by 5-9.5 cm., broadly ovate, with an acumen $^1/_5$-$^1/_6$ as long as the blade, and entire subundulate margins, glabrous, shining, base broad, truncate, slightly narrowed towards the petiole (rarely subcordate), 5-nerved; lateral main nerves 3-6 pairs, rather irregular, prominent only in the young leaves which are red just after unfolding, the venation between the nerves finely reticulate; petioles 6.3-9 cm. long; stipules ovate-lanceolate, 1.3-2.5 cm. long. Receptacles sessile, in pairs, axillary or from old scars, globular, not depressed at the apex, smooth, 1.3 cm. diam. when ripe, when young whitish with dark spots, when ripe nearly black; basal bracts 3, rotund, small. Male flowers few,

only near the mouth of the receptacle. Sepals 3, spathulate. Stamen 1; anther single on a filament as long as itself. Gall and fertile flowers : Sepals 3, lanceolate; gall ovary smooth, usually obovoid. Achenes minutely tuberculate, mucilaginous. Style in both elongate; stigma clavate.

Distribution: Punjab, N. India, Assam, Burma, Central India, W. Peninsula, S. India, Malay Peninsula.—Malay Archipelago.

The Santals use the fruit as a drug. The juice is used in the Konkan to kill worms and is given internally with turmeric, pepper and *ghi,* in pills, the size of a pea, for the relief of asthma; it causes vomiting.

The bark is useless in the symptomatic treatment of snake-bite (Mhaskar and Caius).

Assam: Pakri—; *Bengal:* Gaiaswat, Galasvattha—; *Burma:* Nyaungbyu—; *Cachar:* Satbur—; *Canarese:* Bettaarali, Bettaragi, Kadarali—; *Garhwal:* Kabaru—; *Garo:* Prab—; *Hindi:* Gagjaira, Gajiun, Gajna, Kabar, Khabar, Pakar, Pilkhan, Pipal, Pipul—; *Jaunsar:* Pilkhoi—; *Kolami:* Sumanpipar—; *Kumaon:* Kabaipipal—; *Lohardugga:* Ganjar, Kabaipipal, Sumanpipar—; *Marathi:* Asht, Ashta, Pair, Payar—; *Mundari:* Duranggahesa—; *Nepal:* Pakar—; *Punjab:* Badha, Palak, Pilkhan, Pulakh, Rumbal—; *Rajputana:* Paraspipal—; *Santali:* Sunamjor—.

6. **Ficus religiosa** Linn. Sp. Pl. (1753) 1059.—*Urostigma religiosum* Gasp.; Wigh Ic. t. 1967.—Plate 896A.

A large glabrous usually epiphytic tree. Leaves coriaceous, 10-18 by 7.5-10 cm., ovate-rotund, narrowed upwards and the apex produced into a linear-lanceolate tail about half as long as the main portion of the blade ($^1/_3$ as long as the whole blade), entire, base broad, rounded, truncate, sometimes in young leaves cordate, 5-7-nerved; lateral main nerves about 8 pairs with finely reticulate venation between; petioles 7.5-10 cm. long, slender; stipules minute, ovate, acute. Receptacles in pairs, axillary, sessile, smooth, depressed-globose, 13 mm. diam.; dark purple when ripe; basal bracts broad, spreading. Male flowers few, only near the mouth of some receptacles (absent in others), sessile. Sepals 3, broadly ovate.

Stamen 1; anther single, ovate-rotund; filament short. Gall and fertile flowers sessile or pedicellate, the gall flowers much more numerous than the fertile females, many of them without perianth. Sepals 5, lanceolate. Style short, lateral; stigma rounded.

Distribution: Sub-Himalayan forests, Bengal, Central India. Planted elsewhere.

All the parts are bitter, sweetish, acrid, cooling; useful in diseases of the blood, vagina, uterus; given in leucorrhoea, burning sensation, biliousness, ulcers.—The ripe fruit is cooling; alexipharmic; good for burning sensation, foul taste, thirst, biliousness, diseases of the blood and heart.—The root is good for gout; the root bark is useful in stomatitis, to cleanse ulcers, as an astringent in leucorrhoea, to promote granulations.—The young bark is useful in bone fracture.—The seeds are useful in urinary discharges (Ayurveda).

The root bark is aphrodisiac and good for lumbago.—The bark has an acrid bad taste; useful in inflammations and glandular swelling of the neck.—The old leaves soaked in water stop vomiting. —The fruit is purgative, aphrodisiac; checks vomiting (Yunani).

The bark is astringent, used in gonorrhoea. It has also maturative properties. The fruit is laxative and helps digestion. The seeds are said to be cooling and alterative. The leaves and young shoots are used as a purgative, and an infusion of the bark is given internally in scabies.

A paste of the powdered bark is used as an absorbent in inflammatory swellings.

The dried fruit, pulverized and taken in water for a fortnight, removes asthma, and produces fruitfulness in women. Water in which the freshly-burnt bark has been steeped is said to cure cases of obstinate hiccup. In cracked foot the juice is employed. The powder of the dried bark is used in fistula in ano.

In Ceylon, the juice of the bark is used as a mouth wash for toothache and for strengthening the gums.

The bark is not an antidote to snake-venom (Mhaskar and Caius).

Bengal: Ashathwa, Asud, Asvattha, Aswat—; *Bombay:* Arli, Busri, Jari, Pimpal, Pipal, Piplo—; *Burma:* Nyaungbaudi,

Nyoungbaude—; *Cachar:* Borbur—; *Canarese:* Arali, Arani, Arase, Ashwattha, Aswatha, Basari, Brahmadaru, Pippala, Ragi—; *Ceylon:* Arasa—; *Chinese:* P'ou Ti Chou—; *English:* Peepul Tree, Pipal Tree—; *French:* Allemaron, Aoa, Arbre des conseils, Arbre du diable, Arbre des pagodes, Figuier des pagodes—; *Gond:* Ali—; *Gujerati:* Jari, Pipro, Pipul—; *Hindi:* Pipal, Pipli—; *Khond:* Pipali—; *Kolami:* Hesar, Hissa, Pipar—; *Konkani:* Pimpoll—; *Kumaon:* Pipal—; *Kurku:* Pipri—; *Las Bela:* Doguri—; *Malayalam:* Arachu, Arayal, Ashvatham, Chaladalam, Devataru, Mangalyam, Rohi—; *Marathi:* Ashvatha, Pimpala—; *Mundari:* Tepelhesu—; *Nasirabad:* Pipal—; *Nepal:* Pipli—; *Porebunder:* Piplo—; *Portuguese:* Figueira dos pagodes, Pimpollo—; *Punjab:* Bhor, Pipal—; *Pushtu:* Pippal—; *Sanskrit:* Achyutavas, Ashvatha, Bodhidru, Bodhidruma, Chaityadru, Chaityavriksha, Chaladala, Chalapatra, Devatma, Dhanurvriksha, Gajabhakshaka, Gajapatra, Gajashana, Guhyapushpa, Guru, Kapitana, Keshavalaya, Krishnavasa, Kshiradruma, Kunjarashana, Mahadruma, Mangalya, Nagabandhu, Pavitraka, Pippala, Sevya, Shri, Shrimana, Shubhada, Shuchidruma, Shymala, Vipra, Vishala, Vriksharaja, Yajnika—; *Santal:* Hesak—; *Sibi:* Pipal—; *Sind:* Pipur—; *Sinhalese:* Bo—; *Surat:* Piplo—; *Tamil:* Achuvattam, Arasu, Arayal, Asuvattam, Attiru, Attugamani, Ilanai, Kanavam, Kunjarasanam, Magadurumam, Mara, Narayanam, Padaroganam, Panai, Pittalam, Saladalam, Saranam, Suvalai, Tanavam, Tiru, Vanagandi—; *Telugu:* Ashvaddhamu, Ashvatthamu, Bodhi, Bogaha, Chaladamu, Pippali, Ravi, Rohi—; *Tulu:* Attasa—; *Urdu:* Pipal—; *Uriya:* Osto, Oshwottho, Pippolo, Usto—.

7. **Ficus lacor** Ham. in Linn. Trans. XV (1827) 150.—*F. infectoria* Roxb. Fl. Ind. III (1832) 551 (excel. syn. Rheede); Wight Ic. t. 665.—PLATE 897 (under *F. infectoria* Roxb.).

A large spreading deciduous fast-growing tree, all parts glabrous; bark grey, smooth, scaly. Leaves membranous, 9-12.5 by 5-6.3 cm., ovate or ovate-oblong, shortly and rather abruptly acuminate, with entire, subundulate margins; base usually rounded, slightly cordate, or sometimes narrowed or acute, 3-nerved; lateral main nerves 5-7, not very prominent; petioles 3.8-5.7 cm. long, sometimes

indistinctly jointed with the blade; stipules about 13 mm. long, broadly ovate, acute, pubescent. Receptacles axillary, in pairs, sessile, globose, 6 mm. diam., whitish, flushed with red and dotted when ripe; basal bracts 3, ovate-rotund, minute. Male flowers few, sessile near the mouth of the receptacles. Stamen 1; anther broadly ovate; filament short. Sepals 4 or 5. Gall and fertile flowers: Perianth as in the male. Style of fertile female flowers long, of the gall flowers short; stigma elongate.

Distribution: Plains and lower hills of India, Ceylon.—Malaya.

All parts are acrid, pungent, cooling; useful in diseases of the blood and the vagina, ulcers, burning sensations, biliousness, "kapha", inflammations, leprosy, hallucinations, loss of consciousness (Ayurveda).

The fruit is sour; the seeds are useful in bronchitis, biliousness, scabies, boils, inflammation (Yunani).

The bark of this, along with the barks of other four species of *Ficus* and of *Melia azadirachta*, pass by the name of *Panchavalkala* (or the five barks); they are used in combination. A decoction is much employed as a gargle in salivation, as a wash for ulcers, and as an injection in leucorrhœa.

Bengal: Pakar, Pakur—; *Bombay:* Bassari, Kaim, Pakri, Pipli—; *Burma:* Nyaungchin, Nyoungchin—; *Canarese:* Basari, Basarigoli, Juvvi, Kabbasari, Karibasari, Karibasri, Karibasuri, Plaksha, Ulabasari—; *Garo:* Prab—; *Gond:* Serelli, Serilli—; *Gujerati:* Pepri—; *Hindi:* Kahimal, Kaim, Keol, Khabar, Pakar, Pakri, Pakur, Pilkhan, Ramanjir—; *Kolami:* Baswesa—; *Konkani:* Killah—; *Kurku:* Pepere, Pepre—; *Lambadi:* Katpipri—; *Lepcha:* Kangji—; *Malayalam:* Bakri, Chakkila, Chela, Chuvannal, Itti, Jati—; *Marathi:* Bassari, Dhedumbara, Gandhaumbara, Lendwa, Pakari, Pepar—; *Melghat:* Pahkar—; *Mundari:* Basuhesa, Dindaputkal, Gusahesa, Gusihesa, Hesaputukaldaru, Jojohesa, Joputukal—; *Nepal:* Safedkabra—; *North-West Provinces:* Pakur—; *Punjab:* Batbar, Janglipipli, Pakhar, Palakh, Palkhi, Pilkhan, Pilkin, Trimbal, War—; *Sanskrit:* Ashvatthi, Charudarshani, Dridhapraroha, Gardabhanda, Jati, Kamandalutaru, Kandaralu, Kapitana, Karpari, Kshiri,

Mahabala, Parkati, Pimpari, Pitana, Plaksha, Plavaka, Shringi, Suparshva, Varohashakhi, Vati—; *Saora:* Juvvi—; *Sinhalese:* Kalaha, Kiripella—; *Tamil:* Jovi, Kallal, Kurugatti, Kurugu, Suvi—; *Telugu:* Badijuvvi, Jati, Juvvi—; *Thana:* Kel—; *Tulu:* Basarigoli—; *Urdu:* Pakharia—; *Uriya:* Pakodo, Rushorchona—.

8. **Ficus heterophylla** Linn. f. Suppl. (1781) 442; Wight Ic. t. 659.—*F. scabrella* Roxb.; Wight Ic. t. 661.—PLATE 898.

A shrub, sometimes creeping along the ground or over rocks; branchlets shortly pubescent. Leaves polymorphous, petiolate, membranous, ovate or orbicular-ovate to lanceolate, more or less acuminate, entire or 3-many-lobed, both surfaces scabrous, the margins irregularly and coarsely toothed or repand-dentate, base rounded or cordate, 3-5-nerved; lateral main nerves 4-8 pairs, arched, or in much-lobed leaves palmate; petioles 1.3-6.3 cm. long; stipules 2 to each leaf, 8-13 mm. long, ovate, scarious. Receptacles pedunculate, solitary, axillary, spherical to pyriform, more or less hispid scabrid or warted when young, when ripe nearly smooth, dark orange, always with a more or less prominent mammillate umbilicus which is imperfectly closed by bracts; peduncles 1.3-2.5 cm. long; bracts basal or high up on the peduncle, minute, triangular, glabrous. Perianth of all flowers 3-4-cleft. Male flowers : Stamen 1. Gall flowers : Ovary ovoid, smooth; style short, lateral. Fertile flowers : Perianth hyaline, viscid, tuberculate. Achenes subglobose. Style long, lateral; stigma cylindric.

Distribution: Throughout the hotter parts of India, Ceylon, Malay Peninsula.—Malay Islands.

The juice of the root of this shrub is internally administered in colic pains, and the juice of the leaves mixed with milk in dysentery. The bark of the root, which is very bitter, pulverised and mixed with coriander seed, is considered a good remedy in coughs and asthma and similar affections of the chest.

Bengal: Balabahula, Balalata, Bhuidumur, Gaorishiora, Ghotisuara—; *Canarese:* Adavibende—; *Central Provinces:* Pakhur—; *Chittagong:* Ballamdumur—; *Ilocano:* Uplas—; *Lambadi:* Dhidyarobhindaro— *Malayalam:* Vallitterakam—; *Marathi:* Datir—;

Sanskrit: Trayamani—; *Sinhalese:* Walehetu—; *Tagalog:* Asis—; *Tamil:* Kodiyatti—; *Telugu:* Buroni—; *Uriya:* Gonthisahada—.

9. **Ficus asperrima** Roxb. Fl. Ind. III (1832) 554; Wight Ic. t. 633,—PLATE 899.

A shrub or small tree without aerial roots; young parts scabrous; bark white, smooth. Leaves crowded about the extremities of the branchlets, 3.8-12.5 by 2.2-7 cm., alternate, petiolate, oblong-lanceolate to ovate or obovate or elliptic, entire (very rarely irregularly 3-lobed), blunt or acuminate, serrate, toothed or crenate in the upper part, scabrid and hispid on both surfaces, base usually rounded, 3-nerved; lateral main nerves 3-5 pairs, very prominent and hispid on the lower surface as are the reticulations; petioles 1-3.2 cm. long; stipules minute. Receptacles solitary, pedunculate, globose, 1.3-2.2 cm. diam., slightly depressed at the apex, when ripe yellow or purple with yellowish dots, scabrous-hispid, with rather a prominent umbilicus; basal bracts 0; peduncles 4-6 mm. long. Male flowers numerous in the upper part of the receptacles. Sepals 4-5, linear-lanceolate, scabrid. Stamen 1. Gall flowers: Sepals as in the male. Ovary ovoid-lanceolate; style thick, terminal; stigma dilated. Fertile flowers: Sepals 6-7, linear-lanceolate, smooth. Achenes elongate, obovoid, minutely tuberculate. Style lateral, filiform; stigma obovoid.

Distribution: Central India, W. Peninsula, Ceylon.

The juice and bark are in Bombay well-known remedies for glandular enlargements of the abdomen, such as liver and spleen.

Bombay: Karwat, Kharoti, Khoreti—; *Canarese:* Garagasayele, Garagatti, Gargata, Khargas—; *Gujerati:* Kalambar—; *Malayalam:* Olaparom, Terakam—; *Marathi:* Kharwat—; *Sanskrit:* Kharapatra—; *Saora:* Siribodda—; *Sinhalese:* Sewanamediga—; *Tamil:* Irambarattan, Malandiniyatti—; *Telugu:* Karakabodda, Karasana—; *Tulu:* Andapajevu—; *Uriya:* Korotosano—.

10. **Ficus hispida** Linn. f. Suppl. (1781) 442.—*F. oppositifolia* Willd.; Wight Ic. t. 638.—PLATES 900 & 900A.

A shrub or small tree, all parts more or less hispid-pubescent. Leaves usually opposite, petiolate, membranous, 10-30 by 5-15 cm.,

ovate, oblong, or subobovate, apiculate or shortly and abruptly acuminate, toothed or entire, the lower surface hispid-pubescent, the upper hispid-scabrid, base rounded, subcordate or subcuneate, 3-5-nerved; lateral main nerves 3-5 pairs with fine reticulations between; petioles 1.3-3.8 cm. long (in young shoots 7.5-9 cm. long), densely hispid; stipules 2 to each leaf, ovate-lanceolate, pubescent outside, about 1.3 cm. long. Receptacles 1.3-2.5 cm. across, turbinate, obovoid or subpyriform, yellowish when ripe, slightly umbonate, hispid and sometimes with bracts scattered along the sides, on peduncles 5-15 mm. long in pairs from the axils of the leaves, or in fascicles from shortened tuberculate branches from the old wood, or in pairs or fascicles on elongate stipular bracteate sometimes leafy branches issuing from the larger branches and stem and often reaching to or even penetrating the soil; basal bracts 3. Male flowers rather numerous, near the apex of the receptacle containing the galls. Sepals 3, concave, hyaline. Stamen 1; anther broad; filaments short. Gall flowers pedicellate. Perianth 0. Ovary smooth, globose; style short, subterminal; stigma dilated. Fertile flowers: Perianth 0. (Beddome says it is thin and transparent and easily overlooked). Achenes ovoid; style lateral; stigma cylindric, tubular.

Distribution: More or less throughout India, Ceylon.

All parts are bitter, cooling, acrid; astringent to the bowels, antidysenteric; useful in "kapha", ulcers, biliousness, psoriasis, anæmia, piles, jaundice, hæmorrhage of the nose and mouth, diseases of the blood.—The fruit is sweetish, cooling; aphrodisiac, tonic, lactagogue, emetic; causes "vata" and constipation (Ayurveda).

The acrid milk is used medicinally in Kangra. In Bombay and the Konkan, the powdered fruit heated with water to form a poultice is applied to buboes. It is also given to milch cattle to dry up their milk.

The fruit, seeds and bark are possessed of valuable emetic properties (Moodeen Sheriff).

Arabic: Tinebarri—; *Assam:* Khoskadumar—; *Bengal:* Dumoor, Jogdumur, Kakdumar, Kakodumar—; *Bombay:* Dhedu, Dumbar, Kurwut, Mira, Rambal—; *Burma:* Kaaung, Kadot Kadut—;

Canarese: Adaviyatti, Kadatti, Olapara—; *Central Provinces:* Katumbri—; *Chota Nagpur:* Bhudoi—; *Dehra Dun:* Ghogsha, Gobha, Kaksa—; *Garo:* Shakab—; *Gond:* Bomair, Katumer—; *Gujerati:* Dhedaumaro, Dhedumeru, Jangliangir—; *Hasada:* Kotangdaru—; *Hindi:* Gobla, Kagsha, Katgularia, Kathumæa Koneadumbar, Totmila—; *Khond:* Kerken—; *Kolami:* Kotang, Sosokera—; *Kumaon:* Dhura, Gobla, Kagoha, Kagsha, Tomila—; *Kurku:* Koreh—; *Lepcha:* Taksot, Tyungmoped—; *Magahi:* Maiulok—; *Malaya:* Bhudoi—; *Malayalam:* Erumanakku, Parakam, Parom, Peyatti—; *Marathi:* Bhokada, Bokria, Dherumbar, Kalaumber, Kharawat, Kharoti—; *Michi:* Poksha—; *Mundari:* Potadaru, Setapodo, Sosokera—; *Naguri:* Kotadaru—; *Nepal:* Kharwa, Koksa—; *Pahari:* Kharwa—; *Pampangan:* Asis, Isioisio—; *Panch Mahals:* Dhedumera—; *Persian:* Anjirdashete—; *Punjab:* Daduri, Degar, Rumbal—; *Ramnagar:* Totmila—; *Reddi:* Boddamatti—; *Sadani:* Kothadumair—; *Sanskrit:* Ajaji, Ajakshi, Asuma, Bhadrodumbarika, Chitrabhashaja, Dhvankshanamni, Jaghanaphala, Kakodumbara, Kakodumbarika, Karkashachaduna, Kharadala Kharapatrika, Kshiri, Kshudrodumbarika, Kushthaghni, Malayu, Phalguni, Phalguvatika, Phalu, Rajika, Udumbaraphala—; *Santali:* Sitapordoh—; *Saora:* Karakubodda, Kukkabodda—; *Sinhalese:* Kotadimbula—; *Tagalog:* Agosoc, Agosos, Asis, Isioisio—; *Tamil:* Ottannalam, Peyatti, Sonatti—; *Telugu:* Boddamatti, Boddamedi, Kakimedi, Karakabodda, Karasana, Kukkabodda, Vettimedi, Vettiyatti—; *Uriya:* Bhaidimiri, Korotosano, Sahadaboro—; *Visayan:* Asis, Isioisio—.

11. **Ficus cunia** Ham. ex Roxb. Hort. Beng. 66; Wight Ic. t. 648.—*F. conglomerata* Roxb.; Wight Ic. t. 669.—PLATE 901.

A small or medium sized tree of irregular habit, bark dark grey, young shoots pubescent. Leaves very variable in size, usually about 12.5-20 by 5-7.5 cm. sometimes 5 cm. long or 30 cm. or more, usually elliptic or oblong-lanceolate, acuminate, entire or serrate, scabrid on both surfaces or pubescent beneath, occasionally smooth above, base very unequal, one side with a 3-4-nerved rounded lobe, lateral nerves 9-14 pairs, prominent; petiole 5-15 mm. long, stout,

scabrid, not jointed to the blade; stipules 1.8-2.5 cm. long, linear-lanceolate. Figs in pairs or small clusters on long leafless scaly shoots from the larger branches or from the main stem near the base, shortly pedunculate, 1-1.8 cm. across, globose or pyriform, reddish brown when ripe. Male flowers near the mouth of the receptacle; stamen one.

Distribution: Sub-Himalayan tract and outer hills from the Chenab eastwards up to 4,000 ft., Chota Nagpur, Eastern Satpura Hills, Khasia Hills, Chittagong, Burma.

The fruit is given in aphthous complaints. A bath made from the fruit and bark is a cure for leprosy.

The juice from the roots is given in bladder complaints and, boiled in milk, in visceral obstructions.

Bengal: Dumbur, Jagyadumur, Jajyadomur, Jogdumur, Kurali—; *Burma:* Thadut, Yekhaong—; *Canarese:* Garagasa, Garagasada—; *Chota Nagpur:* Porokpodha—; *Dehra Dun:* Khain, Kheina—; *Hindi:* Ghui, Jahrphali, Kassa, Khain, Khenan, Khewnau, Khini, Khunia, Khurhur, Porho—; *Kharwar:* Porodumer—; *Khond:* Boroha—; *Kolami:* Ain, Riu—; *Kumaon:* Khaina, Khunia Kunia—; *Lepcha:* Sangji, Songsor, Tungshee—; *Magahi:* Jonua, Sodoi—; *Malayalam:* Perina, Perinterakam, Poroh, Teregam, Tontitterakam—; *Marathi:* Porodumer—; *Michi:* Kanai, Palkai, Taikrau—; *Mundari:* Ari, Aridaru, Bambudari, Horopodo, Pododaru, Poradaru, Sibilari—; *Nepal:* Kanhya, Khaniyung—; *Punjab:* Karndol, Kathjular, Kuri, Trumbal—; *Reddi:* Erubodda—; *Sanskrit:* Kharapatra—; *Santali:* Horpodo, Porokhpodha—; *Saora:* Erubodda—; *Tamil:* Taragadi—; *Telugu:* Bommamatti—; *Tulu:* Pajevu—; *Uriya:* Godima, Porishkry—.

12. **Ficus ribes** Reinw. ex Bl. Bijdr. 463.—Plate 902.

An evergreen tree, the young shoots slightly appressed-pubescent; stipules linear-lanceolate, acuminate, shortly appressed-pubsecent. Leaves oblong-lanceolate to lanceolate, unequally sided, on a pubescent petiole 2-4 mm. long, acute at the base, 5-9 cm. long, acuminate, membranous, glabrous, or shortly appressed-pubescent on the midrib beneath, penninerved. Receptacles obovate to turbinate-obovate, the size of a pea, green, smooth, usually furnished with several or some-

times numerous scales on the circumference, tapering into a short stalk, on glabrous peduncles 4-6 mm. long, arising in pairs racemosely along the branched leafless shoots from the trunk or the roots, or more crowdedly from branched short clusters of reduced branchlets; bracts 3, minute, triangular-ovate, glabrous.

Distribution: S. Tenasserim.—Malay Archipelago.

The therapeutic properties are the same as those of *F. hispida* (Moodeen Sheriff).

Hindi: Chhotajanglianjir—; *Malayalam:* Cheriyakattatti—; *Tamil:* Chiriapeyatti—; *Telugu:* Chinnaverriattipandu—.

13. **Ficus palmata** Forsk. Fl. Aegypt-Arab. (1775) 179.—*F. virgata* Roxb.; Wight Ic. t. 649.—PLATE 903.

A deciduous shrub or small tree; young parts tomentose or pubescent; bark grey, smooth. Leaves very variable, 3.8-12.5 cm. long, orbicular or broadly ovate, crenate-dentate, often deeply lobed, scabrous above, usually tomentose beneath, apex rounded or acute, base broadly rounded or cordate, 3-nerved, lateral nerves 3-6 pairs; petiole 2.5-5 cm. long; stipules 7.5 mm. long, ovate, acute. Figs 1.3-2.5 cm. diam., supported by 3 or more acute deciduous basal bracts, axillary, solitary or in pairs, pyriform or globose, contracted towards the peduncle, purple when ripe, peduncle 1.3-2.5 cm. long. Male flowers numerous in the upper part of the receptacles; stamens 3-6.

Distribution: Baluchistan, Salt Range, Punjab, Mt. Abu, Merwara, N.-W. Himalaya as far as Nepal.

The fruits act as demulcent and laxative. They are mostly used as diet in cases of constipation and in diseases of the lungs and bladder. They are also used as poultices.

Afghanistan: Angir, Inzar—; *Central Provinces:* Dhoura—; *Dehra Dun:* Khemri, Pheru—; *Gujerati:* Pepri—; *Hazara:* Phagwara—; *Hindi:* Anjiri, Bedu, Beru, Gular, Khabara, Khemri—; *Jaunsar:* Pheru—; *Kumaon:* Bedu—; *Marwara:* Kembri—; *Nasirabad:* Hanjir—; *Punjab:* Daholia, Dhudi, Dhuru, Fagu, Inzar, Jamir, Kak, Khabare, Kirmi, Kok, Phag, Phagoru, Phagwara, Phedu, Phegra, Thapur—; *Pushtu:* Phagwara—; *Rajputana:* Kembri—;

Telugu: Manjimedi, Medi—; *Tigrinia:* Bellass, Belless—; *United Provinces:* Anjiri—; *Upper India:* Fagwara, Thapur—.

14. **Ficus glomerata** Roxb. Corom. Pl. II (1798) 13, t. 123; Wight Ic. 667.—PLATE 904.

An evergreen tree 15-18 m. high; young shoots glabrous, pubescent or scaberulous. Leaves 7.5-15 by 3.2-6.3 cm., ovate-oblong, or elliptic-lanceolate, tapering to a bluntish point at the apex, with entire margins, glabrous on both surfaces when mature, base acute or rounded, 3-nerved; lateral main nerves 4-6 pairs; petioles 1.3-3.8 cm. long, glabrous; stipules 2 cm. long, ovate-lanceolate, scarious, pubescent. Receptacles shortly pedunculate, on short leafless warted branches which issue from the stem and larger branches, much contracted at the base when young, subglobose, pyriform or subturbinate, 3.2 cm. across, smooth or pubescent, red when ripe, with depressed umbilicus (edible but usually full of worms); basal bracts 3, ovate-triangular; male, female, and gall flowers together in one receptacle, the male flowers forming a zone near the mouth, the fertile female flowers forming a layer near the walls of the receptacle, and the gall flowers a more internal layer. Male flowers sessile. Sepals 3-4, membranous, inflated, enveloping the 2 elongate ovate anthers; filaments connate. Gall flowers pedicellate. Perianth gamophyllous, irregularly toothed, covering only the base of the rough ovoid ovary. Style lateral, elongate; stigma clavate. Fertile flowers subsessile. Perianth gamophyllous, with 4 or 5 long lanceolate teeth enveloping the small minutely tuberculate achene. Style subterminal; stigma clavate.

Distribution: Throughout India, Ceylon.

All parts are cooling, sweet, acrid; vulnerary, anti-dysenteric; useful in "kapha," biliousness, diseases of the vagina. The root is useful in hydrophobia.—The bark is cooling, acrid; galactagogue; good for the gravid uterus.—The unripe fruit is acrid; astringent to bowels; tonic, styptic; allays thirst; useful in "kapha," biliousness, leucorrhœa, and blood diseases.—The ripe fruit is acrid, sweet, cooling; useful in blood diseases, biliousness, burning sensations, fatigue,

urinary discharges, thirst, leprosy, menorrhagia, nose bleeding; causes "kapha" and intestinal worms (Ayurveda).

The bark is useful in asthma and piles.—The leaves are astringent to the bowels and good for bronchitis.—The fruit is sweetish, useful in chronic bronchitis, dry cough, loss of voice, diseases of the kidney and the spleen.—The milk is aphrodisiac and vulnerary, useful in inflammations.—The ashes are diuretic and useful in gleet (Yunani).

The leaves, bark and fruit are employed in native medicine. The bark is given as an astringent and as a wash for wounds. It is also employed to remove the poison from wounds made by a tiger or cat. The root is useful in dysentery, and a fluid obtained from it by incision is administered as a powerful tonic. The leaves reduced to powder and mixed with honey are given in bilious affections. The small blister-like galls common on the leaves, soaked in milk and mixed with honey are given to prevent pitting in small-pox. The figs are considered astringent, stomachic and carminative, and are given in menorrhagia and hæmoptysis. The milky juice is administered in piles and diarrhœa, and in combination with sesamum oil in cancer. The fresh juice of the ripe fruit is used as an adjunct to a metallic preparation which is given in diabetes and other urinary diseases. In Bombay, the sap is a popular remedy, which is locally applied to mumps and other inflammatory glandular enlargements, and is given in doses of four tolas with cumin and sugar for gonorrhœa.

The bark is given to cattle when suffering from rinder-pest. It is ground with onions, cumin, and cocoanut spathes and mixed with vinegar.

The sap of the root is used in diabetes.

An infusion of the bark is much employed by the Tamil-speaking people for menorrhagia.

No part of it is an antidote to either snake-venom (Mhaskar and Caius) or scorpion-venom (Caius and Mhaskar).

Arabic: Jamiza—; *Bengal:* Dumur, Jagyadumar, Yajnadumbar—; *Bombay:* Umbar—; *Burma:* Thapan, Yethaphan—; *Canarese:* Atti, Rumadi—; *Central Provinces:* Umbargular—; *Chamba:* Trimbal—; *Chota Nagpur:* Dumer—; *Gond:* Thoja—;

Gujerati: Umar, Umaro, Umbar, Umbro—; *Hindi:* Dimere, Gular, Lelka, Paroa, Umar, Umrai, Tue—; *Kharwar:* Dumer—; *Khond:* Toga—; *Kolami:* Loa, Lowa—; *Konkani:* Rumbod—; *Kumaon:* Gular—; *Kurku:* Alawa—; *Lambadi:* Golaru, Guldredu—; *Lepcha:* Tchongtay—; *Malaya:* Dumer—; *Malayalam:* Atti, Audumbaram, Jantuphalam, Udumbaram—; *Marathi:* Atti, Gular, Rumadi, Umar, Umbar, Umbara, Umbaram, Umbra—; *Merwara:* Umbri—; *Mundari:* Loadaru—; *Nepal:* Dumri—; *North-Western Provinces:* Gular, Lelka, Panwa—; *Persian:* Tamarpishah—; *Philippines:* Aymit—; *Punjab:* Batbar, Dadhuri, Kakammal, Kathgular, Kumbal, Palak, Rumbal—; *Pushtu:* Ormul—; *Reddi:* Bodda—; *Sanskrit:* Apushpaphalasambandha, Audumbaram, Brahmavriksha, Haritaksha, Hemadughda, Hemadugdhaka, Jadhanephala, Jantuphala, Kalaskandha, Krimikanta, Kshiravriksha, Kunjera, Panimukha, Pavitraka, Pushpahina, Sadaphala, Saumya, Shitaphala, Shitavalkala, Shvetavalkala, Suchakshu, Supratishthita, Udumbara, Yajana, Yajnanga, Yajnaphala, Yajnasara, Yajnayogga, Yajniya, Yana, Yanodumbara—; *Santal:* Loa, Lowa—; *Sinhalese:* Atteeka—; *Tagalog:* Tibig, Tibignalalaqui—; *Tamil:* Adam, Adavam, Adavu, Anai, Anjiram, Asamarudam, Asuvattam, Atti, Ara, Koli, Malaiyinmunivan, Tumbaram, Tuniyangam, Udumbaram—; *Telugu:* Atti, Bodda, Brahmamedi, Medi, Paidi, Udumbaramu—; *Tulu:* Arti, Atti—; *Urdu:* Gular—; *Uriya:* Dimiri, Dumuro, Jognondumburo, Udumboro—; *Visayan:* Aimit, Amison—.

15. **Ficus carica** Linn. Sp. Pl. (1753) 1059.

Resembles F. palmata very closely and is perhaps not specifically distinct. A shrub or small deciduous tree, branchlets and underside of leaves pubescent or tomentose. Leaves cordate, more or less deeply lobed, lobes obtuse, blade 10-20, petiole 5-7.5 cm. long, upperside rough. The tree is dioecious, that is, some trees have elongated receptacles with male and gall flowers while others have shortly pyriform, nearly globose receptacles, containing only female flowers. The leaves in both sexes are the same, but the difference in the shape of receptacles and flowers is so great, that at one time they were regarded as distinct genera or species, the male tree being

called Caprificus. The receptacles of both sexes lengthen out into a stalk, at the base of which are the membranous bracts.

Distribution: Baluchistan.—Afghanistan, W. Asia, and E. Mediterranean.—Cultivated in N.-W. India and the Deccan.

The fruit is sweet, cooling; useful in "vata," diseases of the head and blood, leprosy, nose bleeding (Ayurveda).

The root is tonic; useful in leucoderma and ringworm.—The fruit is sweet; antipyretic, tonic, purgative, alexiteric, aphrodisiac, lithontriptic; useful in inflammations, weakness, paralysis, thirst, diseases of the liver and spleen, pain in the chest, cures piles; stimulates growth of hair.—The milky juice is heating, expectorant, diuretic; dangerous for the eye (Yunani).

The fig is emollient, demulcent, laxative, nutritive. The fresh and dried fruits are used in constipation.

Roasted figs have a place in European domestic practice as a poultice for gumboils, boils and carbuncles.

A poultice of dried figs in milk is said to remove unpleasant odours from ulcers and cancers.

The pulp is mucilaginous and has long been esteemed as a pectoral emollient for coughs; also when stewed and added to ptisans for catarrhal troubles of the air-passages and of other mucous canals.

In its fresh green state the fruit secretes a milky acrid juice, which will destroy warts.

The fig is not an antidote to snake-venom (Mhaskar and Caius).

Arabic: Ten, Tin—; *Bengal:* Anjir—; *Bombay:* Anjira—; *Burma:* Tiethie—; *Canarese:* Anjura, Simeyatti—; *Catalan:* Figuera, Figuera borda—; *Chinese:* Wu Hua Kuo—; *Dutch:* Vijgenboom—; *English:* Fig Tree—; *French:* Figuier—; *German:* Feigenbaum—; *Greek:* Syki, Sykia—; *Gujerati:* Anjir—; *Hebrew:* Tenach—; *Hindi:* Anjir—; *Hova:* Aviavimbazaha—; *Hungarian:* Fugefa—; *Italian:* Fico, Figo—; *Kharan:* Anjir—; *Konkani:* Anjir—; *Malayalam:* Simayatti—; *Marathi:* Anjir—; *Mula Pass:* Anjir—; *Mundari:* Bilaitloa—; *Persian:* Anjir—; *Portuguese:* Figueira, Figueira brava—; *Provence:* Bou—; *Punjab:* Fagari, Fagu, Faguri, Kimri—; *Roumanian:* Smochin—; *Russian:* Figovoi drava, Smokovnitsa—; *Sanskrit:* Anjira, Manjula, Kakodumbar—;

Sarawan: Kohianjir—; *Sibi:* Hinjir, Inzar—; *Spanish:* Cabrahigo, Higuera—; *Swedish:* Fikontrae—; *Tamil:* Simaiyatti, Tenatti—; *Telugu:* Anjuru, Manjimedi, Medi, Simayatti, Teneyatti—; *Urdu:* Anjir—; *Uriya:* Pushposhunyo—.

16. **Ficus arnottiana** Miq. Ann. Mus. Lugd, Bat. III (1867) 287; King Sp. Fic. 56, t. 68 and t. 84, fig. V.

A glabrous tree or shrub. Leaves subcoriaceous, 7.5-20 by 5-15 cm., broadly ovate, narrowed upwards to the shortly caudate-acuminate apex, with entire margins, base usually cordate, never narrowed to the petiole, 7-nerved; lateral main nerves 5-7 pairs, with minute lucid reticulation between; petioles 5-15 cm. long; stipules ovate-lanceolate, 1.3-2.5 cm. long, caducous, reddish-brown when dried. Receptacles mostly from the axils of fallen leaves, in pairs or clusters from tubercles, sessile or shortly pedunculate, depressed-globose, smooth, 6-10 mm. diam., purple with greenish dots when ripe, basal bracts 3, brown, membranous; peduncles when present 2.5-5 mm. long. Male flowers few, near the mouth of the receptacles, sessile. Sepals 3, loose, inflated, broadly acuminate, larger than the small subsessile solitary anther. Gall and fertile flowers undistinguishable except by the contents of the ovary, sessile or pedicellate, the perianth gamophyllous, lax, toothed at the apex, completely investing the ovary. Style elongate; stigma flat.

Distribution: Rajputana, C. Provinces, Bihar, W. Peninsula, Ceylon.

The leaves and bark are used in skin diseases.

Canarese: Bettadarali, Kadarase, Kadasvattha, Kadelage, Kallarase—; *Hindi:* Paraspipal—; *Lambadi:* Pushaval—; *Malayalam:* Amakanniyam; Kallarayal—; *Sanskrit:* Plaksha—; *Saora:* Ravi—; *Sinhalese:* Kaputobo—; *Tamil:* Kagoli, Kallarasu, Kodiyarasu—; *Telugu:* Kallaravi, Kondaravi—; *Tulu:* Chotivalpipri, Kattattasa—; *Uriya:* Plokhyo—.

17. **Ficus dalhousiae** Miq. in Hook. Lond. Journ. Bot. VI, 571; King Sp. Fic. 16, t. 11, and 81A.

An umbrageous tree 9-12 m. Young branches at first softly pubescent, afterwards glabrous. Leaves 10-23 cm., subcoriaceous

petioled elliptic- or broadly- ovate acute entire, base cordate, 3-7-nerved, minutely dotted and puberulous or glabrous above, beneath softly minutely pubescent; nerves 10-12 pairs, rather prominent beneath, with midrib minutely pubescent; petiole 2.5-6.3 cm., pubescent; stipules 1.3-2.5 cm., ovate-lanceolate, much acuminate, puberulous or glabrous. Receptacles in pairs, shortly peduncled axillary obovoid with 3 broad triangular apical scales which and the 3 spreading broad triangular sometimes bifid basal bracts are densely hairy when ripe about 13 mm. diam., pubescent, peduncles about 8 mm. densely hairy. Male flowers very few, only near apex of receptacle, sessile, globose; sepals 3, concave, rounded; stamen 1, connective wide, filament thick adnate. Gall flowers on thick pedicels; perianth gamophyllous; ovary obovoid, smooth; style short. Female flowers sessile; achene ovate; style long, lateral, stigma cylindric.

Distribution: Nilgiris.

The leaves are used in liver complaints and skin diseases.

The fruit is given in diseases of the heart.

Tamil: Kallal—.

18. **Ficus talboti** G. King Sp. Fic. in Ann. Roy. Bot, Gard. Calc. I (1888) 51, t. 63 and t. 84, fig. Q.

A large tree, all plants glabrous; milky juice abundant, that of the young branches yellowish; bark grey, smooth. Leaves thinly coriaceous, 8.8-10 cm. long, ovate or elliptic, shortly caudate-acuminate, entire, smooth and shining, base narrowed, 3-5-nerved; main lateral nerves 6-9 pairs above the basal ones, rather prominent on both surfaces; petioles 2-2.5 cm. long; stipules ovate, 6 mm. long. Receptacles sessile in pairs, axillary, obovoid, rather depressed at the apex, smooth, about 6 mm. across, when ripe greenish-yellow, dotted, basal, bracts 3, ovate, acute. Male flowers few, only near the mouth of the receptacle, sessile. Sepals 3, broadly ovate. Stamen 1; filament short. Gall flowers sessile or pedicellate. Sepals 3, lanceolate. Ovary ovoid, narrowed at each end; style terminal. Fertile flowers: Perianth as in the gall flowers: Style short, lateral. Achenes ovoid or obovoid, minutely tuberculate.

Distribution: S. M. Country, N. Kanara.

A decoction of the bark is used in diarrhœa, ulcers, venereal diseases, and leprosy.

Tamil: Itti, Kalitti—.

19. **Ficus tsiela** Roxb. Fl. Ind. III (1832) 549; King Sp. Fic. 59, t. 73, 74 and t. 84, fig. Z2.

A large spreading tree without aerial roots, all parts glabrous. Leaves thinly coriaceous, 7.5-15 by 3.8-9 cm., broadly ovate or elliptic-lanceolate, acute or obtusely cuspidate, with entire margins, base narrowed or rounded, 3-nerved; main lateral nerves (indistinct till the leaf is dry) about 8-10 pairs with reticulate venation between; petioles 3.8-5 cm. long; stipules 1.3-2.5 cm. long, ovate, acuminate. Receptacles crowded towards the ends of the branches, axillary or from leaf-scars, sessile, globose, about 13 mm. diam., smooth and purple when ripe, basal bracts 3, minute, broadly ovate, scarious. Male flowers sessile. Sepals 3, ovate, acuminate, longer than the single stamen; anther broadly ovate; filament thick, clavate, larger than the anther. Gall and fertile flowers : Sepals 3, ovate, achenes ovoid-reniform, the fertile broader than the gall ones. Style in both long; stigma very long, cylindric.

Distribution: C. Provinces, W. Peninsula, Ceylon.

The bark is used in colic.

Bombay: Pimpri—; *Canarese:* Bilibasari, Doddabasari—; *Ceylon:* Kalatti—; *Gujerati:* Pipar, Pipari, Pipli—; *Hindi:* Jari, Pakri, Pipar—; *Lambadi:* Motpipri—; *Malayalam:* Chela, Koyali—; *Marathi:* Pipar, Pipli, Pipri—; *Sanskrit:* Grihadvaraparshve, Kaninika, Plaksha—; *Sinhalese:* Ehetu, Elanuga—; *Tamil:* Ichi, Kallichi, Selaikkallichi, Sittal—; *Telugu:* Juvvi, Peddajuvvi—; *Uriya:* Jori—.

ANTIARIS Leschen.

Evergreen trees. Leaves alternate, bifarious, penninerved, entire or serrate; stipules small, connate, caducous. Flowers monoecious, the males crowded on the surface of an axillary pedunculate receptacle surrounded by confluent imbricating bracts, the females minute, solitary, in a pyriform involucre of many confluent bracts. Male

flowers : Sepals 3-4, narrowly spathulate, imbricate. Stamens 3-8. Pistillode 0. Female flowers : Perianth 0. Ovary adnate to the involucre; ovule pendulous; style-arms 2, subulate, recurved. Fruit fleshy; pericarp confluent with the receptacle. Seed exalbuminous; testa hard; embryo subglobose; cotyledons equal, fleshy; radicle small, superior.—Species 6.—Indo-Malaya.

A. toxicaria Lesch. is used medicinally in Cochin China and the Malay Archipelago.

A bennettii Seem. is used as an arrow poison in the Tonga Islands.

1. **Antiaris toxicaria** Leschen. in Ann. Mus. Par. XVI (1810) 478.—PLATE 908.

A very tall tree reaching 75 m. in height; trunk often buttressed; bark dark grey, pustular. Leaves 7.5-15 by 3.2-6.3 cm., elliptic-oblong, acuminate, often mucronate, glabrous, entire or serrulate, polished and shining above, base usually rounded but sometimes subcordate or truncate; main nerves 8-10 pairs with reticulate venation between, the midrib velvety; petioles 6 mm. long, stout, velvety. Flowers monoecious, the male receptacles 3-4 together, orbicular, tomentose, 13 mm. diam., peduncles velvety; the females solitary, enclosed in a pear-shaped axillary subsessile velvety involucre of numerous confluent bracts. Male flowers : Sepals 3-4, spathulate, imbricate. Stamens 3-8; filaments erect. Female flowers : Perianth 0. Ovary adnate to the involucre. Fruit red, velvety, 2 by 1.3 cm.; pyriform or subglobose, 1-seeded, on a stalk 10 mm. long.

Distribution: Burma, Pegu, Tenasserim, W. Peninsula, Malay Peninsula.—Malay Archipelago.

In the Konkan and in Canara, the bitter seeds are used as a febrifuge, and in dysentery, one-third to one-half of a seed being given three times a day.

The various wild tribes of the Malay Peninsula use the sap as an arrow and dart poison.

Annam: Cay thain Inh, Cay thuy, Thi—; *Bombay:* Chandkuda, Chandla, Chandul, Charvarmada, Jassoond, Karvat, Kharwat—; *Burma:* Hmyaseik—; *Canarese:* Ajanapatte, Ajjanpatte, Aranyapatte, Aranyi, Bairi, Jajhugri, Jajjuri—; *Cochin China:* Thuoc long—;

English: Upas Tree—; *French:* Anthiar, Anthier, Antiar, Antier, Antjar, Antochar, Antsjar—; *Java:* Anchor, Upas—; *Konkan:* Karwat—; *Malay:* Batang ipoh, Ipoh, Pokok ipoh—; *Malay Archipelago:* Antyar, Aoenao tawao epoe, Guetah tatai, Hipuch, Impo, Ipobatang, Ipoch, Ipoh, Ipokayu, Ipuh, Kayu, Kyass, Lupomatayu, Pohonnupas, Pohonnsirenn, Tata, Tenngik, Ternek, Tingeh, Umai—; *Malayalam:* Arayannali, Nettavil—; *Marathi:* Chandkuda, Chandkura, Chandla, Charvarmada, Karvat, Kharwat—; *Moi:* Chijarre, Kraal, Phu xa Kani, Tam xi gach—; *Sanskrit:* Valkala—; *Sinhalese:* Riti—; *Tamil:* Ali, Arandali, Irainji, Maravuri, Nettavil, Pattai—; *Tulu:* Billupale—; *Uriya:* Bhoonromari—.

ARTOCARPUS Forst.

Evergreen trees with milky juice. Leaves alternate, coriaceous, often very large, entire, lobed or pinnatifid, penninerved. Flowers monoecious, densely crowded on globose or oblong 1-sexual solitary usually axillary receptacles, often mixed with scales which are often thickened or peltate at the apex. Male flowers : Perianth 2-4- lobed or -partite; lobes obtuse, valvate or slightly imbricate. Stamen 1, erect. Pistillode 0. Female flowers : Perianths tubular, confluent below with the receptacle; mouth minute. Ovary straight; ovule pendulous; style central or lateral; stigma entire (rarely 2-3-fid). Fruit a much enlarged fleshy oblong cylindric or subglobose entire or lobed receptacle, clothed with the greatly accrescent fleshy perianths and carpels (anthocarps) which have hardened spinescent or truncate or pyramidal or flat apices. Seed pendulous; testa membranous; albumen 0; embryo straight or incurved; cotyledons fleshy, equal or unequal; radicle short, superior.—Species 10.—Indo-Malaya, China.

1. Fruit oblong or ovoid .... 1. *A. hirsuta.*
2. Fruit oblong or clavate. Anthocarpus pyramidal .... 2. *A. integrifolia.*
3. Fruit globose, sublobed, smooth or wrinkled .... 3. *A. lakoocha.*

A. integrifolia Linn. is used medicinally in China, Cambodia, the Philippine Islands, Madagascar, and La Reunion.

1. **Artocarpus hirsuta** Lam. Encyc. Méthod III, (1789) 210.

A large evergreen tree attaining 60 m. in height; young shoots, petioles, peduncles, stipules, midribs, and main nerves appressedly hispid with long tawny hairs. Leaves 15-23 by 10-15 cm., broadly ovate or elliptic (rarely obovate), subacute, coriaceous, entire, smooth, and when adult glabrous except on the midrib and nerves beneath, slightly narrowed to the base; main nerves about 10 pairs, prominent beneath; petioles stout, 1.3-2.2 cm. long; stipules nearly 2.5 cm. long, lanceolate. Flowers on axillary pedunculate receptacles; the male receptacles narrowly cylindric, at first erect or ascending, afterwards pendulous, 10-15 cm. long and about 6 mm. diam.; the female receptacles erect, 11.5 by 9 cm. Male flowers : Sepals 2, united below. Stamen 1; anther exserted, ovate. Receptacle-scales (bracteoles) chaffy, not peltate. Female flowers : Perianth tubular, confluent below with the receptacle. Fruit size of a lemon, echinate, the spines (free apices of anthocarps) about 6 mm. long, cylindric, straight, hispid, perforate at the apex for the filiform style, edible. Seeds 1.3-2 cm. long, ovoid.

Distribution: W. Peninsula.

The dry leaves and juice together with zedoary and camphor are applied to buboes and swelled testicles (Rheede).

Canarese: Hebbalasu, Hebhalasu, Hebhulsina, Hechchuva, Kaduhalasu, Pugguhalasu—; *Coorg:* Aini—; *English:* Wild Jack—; *Madagascar:* Ampalibe, Voanampalibe—; *Malayalam:* Annili, Ayani, Ayini, Ayinipilavu, Kattupilavu—; *Marathi:* Patphanas, Patphunnas, Ranphanas, Ranphunnas—; *Sakalave:* Finesy—; *Tamil:* Akkini, Anjali, Anjili, Ayanibila, Ayini, Kandambala, Kattuppala, Peyppala—; *Tulu:* Katupanasa, Paja—.

2. **Artocarpus integrifolia** Linn. f. Suppl. (1781) 412.—Plate 906.

A well-known tree with very dense rounded crown, coriaceous elliptic entire (or in young plants sometimes lobed) leaves 10-20 cm. long, of a dark shining green above. Petiole 1.3-2.5 cm. Stipules glabrous long sheathing and leaving an annular scar after falling. Male receptacles cylindric 5-15 cm. without bracteoles to the

flowers, sepals 2. Fruiting receptacles attaining enormous size, 30-75 cm. tubercled.

Distribution: Probably indigenous in the W. Ghats.—Widely cultivated.

The unripe fruit is acrid; carminative, tonic; useful in "kapha."—The ripe fruit is cooling, oleagenous; tonic, fattening, aphrodisiac; useful in biliousness, "vata," leprosy, ulcers; causes "kapha."—The seeds are sweet; diuretic, aphrodisiac, constipating (Ayurveda).

The young leaves as fomentation are applied to boils and wounds to dry them.—The fruit is sweet with a pleasant taste; tonic, aphrodisiac; enriches the blood.—The seeds are aphrodisiac (Yunani).

The juice of the plant is applied externally to glandular swellings and abscesses to promote suppuration. The tubers, if worn on the waist, are said to cure hydrocele. The young leaves are used in skin diseases, and the root is used internally in diarrhoea.

The leaves are considered an antidote to snake-poison. They enter in a compound Munda medicine drunk to stop vomiting.

The unripe fruit is astringent, the ripe laxative, but rather difficult to digest, although very nutritious.

The leaves are not an antidote to either snake-venom (Mhaskar and Caius) or scorpion-venom (Caius and Mhaskar).

In Cambodia, the wood is considered a nervous sedative, and is administered in convulsions. The pith is taken internally as an abortifacient.

Assam: Kanthal—; *Bahia:* Jacqueira amarella, Jacqueira vermelha—; *Bali:* Tatwel—; *Bengal:* Kanthal, Kathal—; *Bombay:* Phanas—; *Borneo:* Polomitsjoe—; *Brazil:* Jacadura, Jacamanteiga, Jacamolle, Jacueira—; *Burma:* Peingnai, Peinne, Pienne—; *Cambodia:* Khnor—; *Canarese:* Halasina, Halasu, Halsina, Jaca, Kantakaphaa, Kujje, Kuvi, Panasa, Tage—; *Ceylon:* Kos, Kuthal—; *Chinese:* Po Lo Mi—; *Cochin China:* Cay mit, Mit—; *Dutch Indies:* Boerat—; *English:* Jaca Tree, Jack Fruit Tree, Jack Wood, Orange Wood—; *French:* Jacquier, Jaq, Jaques, Jaquier—; *French Guiana:* Jaca, Jacquier—; *Garo:* Teprong—; *Gujerati:* Vanas—; *Hindi:* Chakki,

Kanthal, Kathal, Kathar, Katol, Panos, Panasa—; *Ilocano:* Langca—; *Java:* Mongko, Roppotjedo—; *Kolami:* Poros—; *Konkani:* Ponnoss—; *Lambadi:* Panasero—; *La Reunion:* Jaquier—; *Lepcha:* Kathari, Marsyarpot, Ramsukung—; *Madagascar:* Ampalibe, Finesy, Voanampalibe—; *Madura Island:* Rappotsjidoe—; *Malacca:* Nanka, Nanksa—; *Malaya:* Tjoelaadokkampong—; *Malayalam:* Chakka, Itichchakka, Kandakiphala, Kantaki, Kottachchakka, Pilavu, Plavu, Varikka—; *Marathi:* Phanas, Phunnas—; *Mundari:* Kantaradaru—; *Nepal:* Rukhkathar—; *Para:* Jaca de Bahia—; *Portuguese:* Jaca, Jaqueira—; *Sanok:* Punusa, Tjampada—; *Sanaskrit:* Apushpa, Ashaya, Atibrihatphala, Champa, Champakalu, Kantakaphala, Kantakiphala, Kantaphala, Kantiphala, Kosha, Mahasarja, Mridangaphala, Mulaphalada, Murajaphala, Palasa, Panas, Panasa, Pashumusta, Phalada, Phalasa, Phalavrikshaka, Phalina, Phanasa, Putaphala, Skandaphala, Sthula, Sthulakantaphala—; *Santali:* Kanthar—; *Sinhalese:* Cos—; *Sumatra:* Pussar—; *Sunda Islands:* Nanka, Nanka beurriot—; *Tagalog:* Lanca, Nanca, Nangca—; *Tamil:* Murasabalam, Pagal, Pala, Palasu, Palavu, Panasam, Pila, Sira, Tagar, Vasukkai, Verppala—; *Telugu:* Panasa, Verupanasa—; *Ternate:* Ambi—; *Timor:* Nankabuhriet—; *Tulu:* Gujja, Pela—; *Urdu:* Katahal—; *Uriya:* Ichodopholo, Kontokalo, Ponoso—.

3. **Artocarpus lakoocha** Roxb. Fl. Ind. III (1832) 524.—PLATE 907.

A large deciduous tree reaching 15-18 m. in height with a spreading head; bark rough, grey; young shoots thin, densely clothed with a soft grey, tawny or rusty tomentum. Leaves coriaceous, 10-30 by 5-15 cm., oblong, elliptic or subovate, entire (the young ones sometimes serrate), obtuse, cuspidate, glabrous and shining above, softly pubescent beneath, base broad or narrow, truncate or rounded; main nerves 6-12 pairs with reticulate venation between; petioles 1.3-2.5 cm. long, lanceolate tawny-pubescent. Flowers in axillary globose shortly pedunculate heads; bracteoles peltate. Male flowers : Sepals 2-3, triangular, truncate, puberulous. Stamen 1; filament broad below, tapering upwards; anther exserted, short, broad, 2-celled. Female flowers : Anthocarps completely united. Fruit 5-7.5 cm.

diam., lobulate, smooth, velvety, yellow, edible. Seeds oblong, few, broad, about 13 mm. across.

Distribution: Sub-Himalayan tracts and outer hills, Khasia, Burma, Malay Peninsula, W. Peninsula, Ceylon.

The unripe fruit is hot, sweet, sour; causes constipation, "tridosha," impotency, loss of appetite, blood complaints, eye troubles.—The ripe fruit is sweet, sour; causes "kapha;" aphrodisiac; improves taste and appetite (Ayurveda).

The unripe fruit causes fever.—The ripe fruit is sour, sweet, indigestible; causes cough, impotence, loss of appetite; useful in biliousness, fever due to cough; tonic to the liver.—The seeds are a good purgative for children (Yunani).

In Bengali, one or two seeds, or a small quantity of the milk, is popular as a purge.

Among the Mundas of Chota Nagpur the milky juice is used in very small doses, one or two drops for children, more for adults, as a purge. For small pimples and cracked skin an infusion of the bark is applied. The bark finely powdered is applied to sores to draw out the purulent matter.

Assam: Chama, Chamba, Dewa—; *Bengal:* Dahu, Dehua, Dephal, Lakucha, Madar—; *Bombay:* Lahu, Lovi—; *Burma:* Miauktot, Myauklaung, Myauklok, Myouklouk—; *Cachar:* Dawa—; *Canarese:* Esuluhuli, Lakucha, Otehuli, Vatehuli, Vonte—; *Deccan:* Lahu, Lovi—; *English:* Monkey Jack—; *Gujerati:* Lakucha—; *Hasada:* Daudaru—; *Hindi:* Badahara, Barhal, Dahu, Dhao, Dhau, Dhava, Dheu, Lakuch—; *Kanara:* Vonte—; *Khond:* Losendri—; *Kolami:* Dahu—; *Konkani:* Otambi—; *Kumaon:* Dhao, Dhaun—; *Lepcha:* Sungyenkung—; *Malay:* Tampang ambong—; *Malayalam:* Chimpa, Lakucham, Pulinjakka, Tittimpilavu—; *Marathi:* Badhar, Kshudraphanas, Phala, Vatara, Votamba, Wotomba—; *Naguri:* Dahudaru—; *Nepal:* Barrar, Borhar—; *Punjab:* Daheo, Tiux, Tuendheu—; *Sadani:* Daudaru—; *Sanskrit:* Airawata, Amlaka, Dahu, Dridhavalkala, Granthimatphala, Kashayi, Karshya, Kshudrapanasa, Lakucha, Likucha, Nikucha, Shalashura, Sthulaskandha—; *Santali:* Dahu—; *Sinhalese:* Etaheraliya, Kaunagona—; *Tamil:*

Ilagusam, Irappala, Solaippakku, Tinippalavu—; *Telugu:* Kammaregu, Lakuchamu, Likuchamu, Nakkaremu—; *Tulu:* Esalpuli—; *Urdu:* Barhal—; *Uriya:* Jeuto—.

URTICA Linn.

Annual or perennial herbs, rarely suffruticose, with stinging hairs. Leaves opposite, toothed or lobulate, base 3-7-nerved; stipules lateral, free or connate. Flowers mono- or dioe- cious, in axillary unisexual or androgynous cymose clusters. Male flowers : Sepals 4, ovate, imbricate. Stamens 4, inflexed in bud. Pistillode cupular. Female flowers : Sepals 4, outer usually much smaller. Ovary straight, stigma sessile or subsessile, feathery or penicillate; ovule erect, orthotropous. Achene embraced by the sepals, ovoid or oblong, compressed, membranous or thinly crustaceous. Seed erect, adherent to the pericarp, albumen scanty, cotyledons rounded.—Species 30.—Temperate.

1. Leaves wrinkled, ovate or ovate- cordate or -lanceolate, acuminate, doubly crenate or serrate. Stipules connate .... 1. *U. parviflora.*
2. Leaves ovate-cordate, oblong or lanceolate, serrate. Stipules free .... 2. *U. dioica.*
3. Leaves ovate or cordate, deeply and regularly toothed ...... 3. *U. pilulifera.*

Irritant and diuretic properties predominate in the genus.

The following species are used medicinally in Europe—*U. dioica* Linn., *U. pilulifera* Linn., *U. urens* Linn.—; in Siberia—*U. cannabina* Linn.—; in China—*U. thunbergiana* S. & Z.—; in Sumatra—*U. tenacissima* Lesch.—; in Tahiti—*U. argentea* Forst.—; in Brazil—*U. baccifera* Jacq., *U. caravellana* Schrank.—; in South Africa—*U. dioica* Linn. var. *eckloniana*, *U. meyeri* Wedd. var. *lobulata*, *U. urens* Linn.—.

1. **Urtica parviflora** Roxb. Fl. Ind. III (1832) 581; Wight Ic. t. 690.

Herbaceous, slender, monoecious, glabrous or pubescent. Root perennial; stem 90-150 cm., slender, sparingly branched, obtusely angled. Stinging hairs copious, stiff. Leaves 2.5-10 cm., membranous, wrinkled, ovate or ovate- cordate or -lanceolate,

acuminate, doubly crenate or serrate; stipules connate, ovate-oblong, entire, puberulous; petiole 0.6-5 cm. Cymes shortly peduncled, slender, effuse, axillary and forming an erect terminal pyramidal panicle; lower males more simple; inner fruiting sepals rounded, twice as long as the outer; male and fruiting sepals hispid.

Distribution: Temperate Himalaya, 5,000-12,000 ft. Nilgiris.

A decoction is given in fevers.

North-Western Provinces : Berain, Bichhu, Shishona—.

2. **Urtica dioica** Linn. Sp. Pl. (1753) 984.

Herbaceous, monoecious or dioecious, pubescent, stinging hairs copious. Leaves ovate-cordate oblong or lanceolate serrate; stipules usually free. Cymes unisexual rarely androgynous, inner fruiting sepals longer than the outer.

Habit of *U. parviflora,* but differing in the free stipules.

Distribution: N.-W. Himalaya, from Kashmir and the Salt Range to Simla, 8,000-10,700 ft.—W. Tibet, westwards to the Atlantic.

The root is diuretic.

The juice of the plant is used as an external irritant. The decoction is used as a diuretic, astringent, emmenagogue, anthelmintic. It has been found useful in nephritic troubles, in hæmorrhages—especially from the kidneys or uterus—, consumption and jaundice.

In Europe, the flowers, leaves, and seeds are all used as diuretic, astringent, and tonic. The seeds are prescribed in consumption.

Tea made from the young tops is a Devonshire cure for Nettlerash. Nettle tea and Nettle tincture are curative of feverish gout, as well as of intermittent fever and ague. Either remedy will promote a speedy extrication of gravel through the kidneys.

Fresh Nettle juice in doses of from one to two table-spoonfuls is a most serviceable remedy for all sorts of bleeding, whether from the nose, the lungs, or some internal organ. Also the decoction of the leaves and stalks taken in moderate quantities is capital for many of the minor skin maladies. When dried, the leaves will often relieve asthma and similar bronchial troubles by inhalation, although other means have failed.

For sciatica, for incipient wasting, for the difficult breathing of

some heart troubles (where such stimulation along the backbone affords more prompt and complete relief than any other treatment), for some coughs, palsy, suppression of the monthly flow in women, rheumatism, and for lack of muscular energy, "urtication"—slapping or pricking with a bundle of fresh Nettle twigs for one or more minutes, once or several times in the day—is said to be an invaluable resuscitating measures which has been successfully resorted to by the peasantry of Russia from time immemorial.

Afrikaans: Brandnekel, Brandnetel—; *Baskir:* Ketskan—; *Catalan:* Ortiga grossa, Ortiga major—; *Danish:* Stor broendenelde—; *Dutch:* Groote brandenetel—; *English:* Common Nettle, Greater Nettle, Naughty Man's Plaything, Nettle, Scaddie, Stinging Nettle, Stingy Nettle, Tinging Nettle—; *Finland:* Nockainen—; *French:* Grande Ortie, Ortage, Ortie, Ortie dioique, Ortuge—; *German:* Estelkraut, Grosse Brennessel, Haarnessel, Habernessel, Hartnessel, Heiternessel, Hirdenessel, Hirrernessel, Nessel, Scharfnessel, Tausendnessel—; *Irish:* Neantog—; *Italian:* Ortica maggiore, Ortica maschia, Orticone—; *Kirghiz:* Kirtken—; *Polish:* Pokrzywa—; *Portuguese:* Ortiga maior—; *Roumanian:* Urzica—; *Russia:* Krapiva, Kropiwa schikowka—; *Spanish:* Ortiga mayor—; *Suso:* Bobatsi—; *Swedish:* Braennaetsla—.

3. **Urtica pilulifera** Linn. Sp. Pl. 983.

An annual, attaining 60 cm. and very stinging. Leaves ovate or cordate, deeply and regularly toothed. Male flowers in little, distinct clusters along pedicels, often as long as the leaves; the female in globular beads, on the summit of a pedicel from 2-2.5 cm. long. When in fruit these beads are 8-12 mm. in diam., and thickly beset with stinging bristles.

Distribution: Occurs occasionally near houses in Simla and elsewhere.—A native of Europe.

The plant is used medicinally in Spain as a substitute for *U. dioica.*

Catalan: Ortiga de pilotas—; *English:* Roman Nettle—; *French:* Ortie à globules, Ortie romaine—; *Maltese:* Hurrieka taz-zibeg—; *Spanish:* Ortiga de pelotillas—.

Laportea Gaud.

Perennial herbs, shrubs or trees, with (sometimes very minute) stinging hairs. Leaves alternate, entire or toothed, 3- or penninerved. Stipules in opposite free or connate pairs. Flowers mono- or dioe- cious, in axillary paniculate usually unisexual cymes or racemes, upper cymes usually very long and male, flowers and fruit often reflexed. Male flowers : Sepals 4-5, subvalvate. Stamens 4-5, inflexed in bud. Pistillode clavate or subglobose. Female flowers : Perianth-lobes or segments 4, subequal or outer small, one sometimes absent. Ovary at length oblique; style linear, papillose on one side; ovule erect. Achene oblique, flattened or compressed, membranous or fleshy, seated on the perianth, sometimes obliquely stipitate. Seed subexalbuminous, cotyledons broad.—Species 40.—Warm countries.

L. gaudichaudiania Wedd. is used medicinally in the Philippine Islands.

1. **Laportea crenulata** Gaud. in Freyc. Voy. Bot. 498.—*Urtica crenulata* Roxb.; Wight Ic. t. 686.—Plate 908.

Stem 2.4-3 m., stout, shrubby; whole palnt clothed more or less with very minute stinging hairs. Leaves 23-30 cm., oval to oblong or oblong-lanceolate, acute, acuminate or caudate, entire or margins minutely sinuate or crenulate, base obtuse acute or notched, veins 12-16 pairs, petiole 2.5-10 cm., stout; stipules small. Cymes short, dichotomously branched; flowers dioecious, shortly pedicelled, pedicel cylindric. Male flowers : Sepals equal, free. Female flowers : Perianth minute, subcampanulate, lobes acute, style stout, villous to the base. Achene erect, turgid, obliquely ovoid.

Distribution: Tropical Himalaya from Sikkim eastwards, Assam, Khasia Hills and southwards to Perak, Ceylon.—Sumatra, Malay Islands.

In Patna, the seeds are used in the same way as coriander (Irvine).

In North Lakhimpur, the juice of the root is used in long-standing fevers (Carter).

This nettle is used by the east coast Negritos of Malaya with the fresh juice of the upas tree for poisoning their darts. When used

in Kelantan as a poison by criminals the flowers and leaves are mixed in cakes with a view to causing death.

Assam: Sirnat—; *Bengal:* Chorpatta, Surat—; *Burma:* Petyagyi, Pheytakyee—; *English:* Devil Nettle, Elephant Nettle, Fever Nettle—; *Lepcha:* Mealumma, Ongyalop, Sunkrong—; *Malay:* Jelatang gajah, Yelatoung—; *Malayalam:* Anachoriyanam—; *Nepal:* Moringi—; *Pahang:* Daungatal, Rumpai—; *Sinhalese:* Mausa—; *Tamil:* Ottapilavu, Ottarbala—.

BOEHMERIA Jacq.

Shrubs or small trees. Leaves opposite and alternate, toothed, 3-nerved; stipules usually free. Flowers in unisexual axillary or spiked racemed or panicled clusters. Male flowers: Perianth 3-5 -lobed or -parted, valvate. Stamens 3-5, inflexed in bud. Pistillode clavate or globose. Female flowers: Perianth tubular, 2-4-toothed, fruiting sometimes angled winged or swollen. Ovary included; stigma filiform, persistent; ovule erect. Achene closely invested by the perianth, crustaceous, at length free. Seed albuminous; cotyledons ovate.—Species 60.—Tropics and N. subtropics.

B. nivea Hook. and Arn. is used medicinally in China, *B. caudata* Sw. in Brazil.

1. **Boehmeria nivea** Hook. & Arn. in Bot. Beech. Voy. 214. —*Urtica nivea* Linn. Sp. Pl. 985.

A shrub with herbaceous branches, tomentose with long hairs. Leaves broad-ovate, acuminate, dentate, upper side rough, under side usually white, densely matted with appressed hairs. Flowers greenish, monoecious, in axillary unisexual panicles, shorter than leaves, which generally are in pairs, male panicles in the lower, female in the upper axils, style much exserted, hairy.

Distribution: Cultivated in the warmer parts of India, especially Assam and Bengal. Native of the Malay Islands, China and Japan.

The roots are aperient and the leaves resolvent.

Assam: Rhea—; *Bengal:* Kankhura—; *Burma:* Goun—; *Cagayan:* Lapnis—; *Chinese:* Chu Ma—; *English:* China Grass,

Rami Grass, Rheea Fibre—; *French:* Ortie de Chine argentée, Ortie à feuilles blanches, Ramie, Ramie blanche—; *Ilocano:* Arimai, Cagayan, Labnis—; *Japanese:* Akaro, Karao, Mao, Siri, So, Tsjo—; *Java:* Rameh, Ramie—; *Malay:* Rameh, Ramie—; *Nepal:* Poah—; *Philippines:* Apoo, Canton, Labrus, Rami—; *Siam:* Caloee, Ghoni, Klooi—; *Spanish:* Ramio—; *Sumatra:* Caloee, Ghoni, Klooi—; *Tagalog:* Amiray—; *Uriya:* Bryddhingi—; *Visayan:* Pampangpangon—.

PLATANACEAE.

Deciduous monoecious trees with flaking bark. Leaves alternate palmately- lobed and -nerved; petiole calyptriform at the base, enclosing a bud; stipules caducous. Flowers in long-peduncled globose unisexual axillary heads; sepals on a chaffy or silky receptacle. Male ebracteolate; anthers numerous, subsessile, with a small basal scale, cells parallel, connectives truncate or subpeltate. Female of many naked 1-celled ovaries mixed with slender bracteoles, narrowed into a long style stigmatose on one side; ovule 1, rarely 2, pendulous, orthotropous. Ripe carpels coriaceous, cuneiform, angled, top thickened truncate or pyrimidal; seed linear, albumen scanty or 0, cotyledons long narrow, radicle inferior.—Genus 1. Species 5.—N. temperate.

PLATANUS Linn.

Characters of the order.

P. orientalis Linn. is used medicinally in Europe.

The balsam of *Liquidambar orientalis* Mill. (*Platanus orientalis* Pococke) is officinal in Portugal.

1. **Platanus orientalis** Linn. Sp. Pl. 999.—PLATE 911A.

A large deciduous tree, bark of young trees always, of old trees frequently, peeling off in large thin flakes leaving the stem smooth

and pale, often nearly white, young parts tomentose. Leaves alternate, 12.5-20 cm. long, often broader than long, deeply 5-7-lobed (rarely 3-lobed), the lobes much longer than broad, glabrous when mature, 3-5 strong palmate nerves starting usually a little above the base; petiole 3.8-6.3 cm. long, the base with a conical hollow which fits over the bud; stipules large, connate, amplexicaul, silky, caducous. Flowers monoecious, slightly perigynous, densely crowded, in unisexual globose heads, heads 2-5 on a long terminal pendulous peduncle. Male flowers 3-4-merous; sepals hairy, petals glabrous, both minute and scale-like often more or less confluent; stamens as many as sepals, anthers almost sessile consisting of two long parallel cells adnate to a connective which is peltately expanded and hairy at the tip. Female flowers : perianth of the male, carpels as many as sepals, free, hairy at the base passing gradually into the styles; ovule 1, rarely 2 in each carpel, pendulous; style hooked at the tip; stigma a long strip running down the style. Fruit a globose head 3.3 cm. diam., consisting of numerous 1-seeded achenes densely clothed at the base with long fine hairs, narrowed gradually into the persistent styles.

Distribution: N.-W. Himalaya, 5,000—8,500 ft. Cultivated only.—Wild from N. Persia to S. Italy.

The bark is useful in leucoderma, poisonous bites of animals.—The fruit has a bitter, bad taste.—The fruit and leaves are good for ophthalmia, lachrymation, toothache, wounds, leucoderma, throat and voice troubles, diseases of the kidney and lung (Yunani).

The fresh leaves are bruised and applied to the eyes in cases of ophthalmia; the bark boiled in vinegar is given in diarrhoea, dysentery, hernia and toothache.

In Europe, it is mostly used as a vulnerary.

Chaman: Chinar—; *Dutch:* Plataan—; *English:* Oriental Plane, Plane Tree—; *French:* Platane—; *German:* Platane—; *Hebrew:* Aramon—; *Italian:* Platano—; *Kashmir:* Bhunj, Boin, Bonin, Buin, Buna—; *Persian:* Chinar, Dulah—; *Pishin:* Chinar—; *Portuguese:* Platano—; *Punjab:* Buin, Buna, Chanar, Chinar—; *Pushtu:* Chinar, Chintar—; *Quetta:* Chinar—; *Roumanian:* Platan—;

Russian: Chinar—; *Spanish:* Platano, Platano de Oriente—; *Urdu:* Chinar—.

JUGLANDACEAE.

Trees, often strongly aromatic. Leaves alternate, pinnate, stipules 0. Flowers unisexual, monoecious. Male flowers in pendulous catkin-like spikes, anthers 2 or more, nearly sessile, inserted on the upper surface of a bract which bears on its edge 2-6 membranous perianth-lobes. Female flowers in many- or few- flowered spikes, bracteate; perianth adnate to the 1-celled ovary, limb minutely 4-toothed; petals 0 or minute, ovule 1 erect; style short, 2-fid, the arms stigmatose and papillose within. Fruit a drupe or nut.—Genera 6. Species 40.—N. temperate, tropical Asia.

Stimulant; astringent and resolvent; purgative and anthelmintic.

Official :—Juglans regia Linn. (Austria, Belgium, Germany, Switzerland),=*Wallia regia* Alefeld (Portugal).

Juglans Linn.

Male flowers from the scars of last year's leaves; stamens 10-40. Female flowers one or few at the ends of the branches; petals 4, minute. Fruit as above.—Species 12.—Asiatic and N. American.

Bark astringent; leaves stimulant, astringent and resolvent; rind of green fruit purgative and anthelmintic.

J. regia Linn. is used medicinally in Europe, China, and Malaya; *J. cinerea* Linn. and *J. nigra* Linn. in North America.

Official :—The leaves of *J. regia* Linn. (Austria, Belgium, Germany, Switzerland); the leaves and seeds of *J. regia* Linn.=*Wallia regia* Alefeld (Portugal).

1. **Juglans regia** Linn. Sp. Pl. (1753) 997.—Plate 909A.

A large deciduous tree, leaves and bark aromatic; bark on old stems marked by parallel vertical furrows, grey; young shoots

tomentose. Leaves 15-38 cm. long, imparipinnate, more or less tomentose when quite young. Leaflets 5-9 (-13) the terminal largest, 7.5-20 by 3.8-10 cm., variable, from elliptic to oblong-lanceolate, acute or acuminate, usually entire, glabrous or pubescent along the nerves beneath, the lateral leaflets opposite or subopposite, sessile or subsessile. Male spikes lateral on the shoots of the previous year, 5-12.5 cm. long, often 2 superposed to one leaf-scar; bracts stipitate; stamens 10-20, apiculate. Female flowers 1-3, sessile, in a short terminal spike; calyx-tube 6 mm. long, ovoid, densely tomentose, limb minute, obscurely 4-toothed; petals green, linear-lanceolate, usually minute. Fruit a drupe, 5 cm. long, ellipsoid, green, pericarp (composed in part of the calyx-tube) leathery, aromatic, nut externally distinctly 2-valved corresponding to the 2 carpels of which the ovary is composed, rugose, internally incompletely divided by 2 coriaceous dissepiments one separating the 2 cotyledons the other dividing them into 2 lobes.

Distribution: Temperate Himalaya 3,000—10,000 ft., wild and cultivated, Khasia Hills cultivated, Ava Hills, Baluchistan.—N. Persia, Caucasus, Armenia.

The therapeutic properties are the same as those of *Aleurites moluccana* (Ayurveda, Yunani).

The bark is used as an anthelmintic and detergent; the leaves are astringent and tonic, in decoction are supposed to be specific in strumous sores, and to be anthelmintic; the fruit is also believed to have an alterative effect in rheumatism.

The bark and leaves are considered alterative, laxative, and detergent in Europe. They are used in herpes, eczema, scrofula, and syphilis. Externally the infusion is used as an application to skin eruptions, ulcers, etc.

The vinegar of the pickled young fruit makes a very useful gargle for sore throats, even when slightly ulcerated. The kernel of the nut affords an oil which has proved useful when applied externally for troublesome skin diseases of the leprous type.

The leaves are said to be antisyphilitic, likewise the green husk, and unripe shell. Obstinate ulcers may be cured by sugar saturated with a strong decoction of the leaves.

In Malaya, walnut kernels are said to produce plumpness of

the body, and to strengthen and lubricate the muscles. They are recommended in heartburn, colic, and dysentery.

Afghanistan: Ughz, Waghz—; *Arabic:* Jawzah, Jbuz—; *Armenian:* Ankus—; *Assam:* Kabsing—; *Bengal:* Akhrot, Akrut—; *Bhutia:* Tagashing—; *Burma:* Siskhyasi, Thitcha, Thitsya, Tikyazi—; *Canarese:* Akrodu—; *Catalan:* Nogue, Noguer, Noguera—; *Chinese:* Hu T'ao—; *Danish:* Noeddetrae—; *Dutch:* Ockernootenboom—; *English:* Wallnut Tree—; *French:* Gognier, Noyer—; *Garhwal:* Akhor, Karaunt—; *German:* Nussbaum, Walnuss—; *Greek:* Karydia—; *Gujerati:* Akhrot—; *Hebrew:* Egoz—; *Hindi:* Akhor, Akhrot, Akrot, Khor—; *Hungarian:* Dio, Olassdio—; *Italian:* Noce—; *Jaunsar:* Akhor, Okhar—; *Kashmir:* Akhor, Dun, Krot—; *Kumaon:* Akor, Akrot, Ka, Kharot, Khol—; *Languedoc:* Ensauria, Knau—; *Lepcha:* Kowal—; *Malaya:* Hup thor—; *Marathi:* Akroda—; *Nepal:* Okhar—; *North-West Provinces:* Ak, Akhor, Akhrot, Kharat—; *Pangi:* Than—; *Persian:* Chaharmaghz, Charmaghz, Girdagan, Jaoz—; *Portuguese:* Noguera—; *Polish:* Orzeszuma wloska—; *Punjab:* Akhori, Akhrot, Charmaghz, Darga, Dun, Ka, Kabotang, Khor, Krot, Starga, Thanka, Thanthan, Ughz, Waghz—; *Quetta:* Jauz—; *Roumanian:* Nuc—; *Russian:* Orechovve derevo—; *Sanskrit:* Akhoda, Akhota, Akschoda, Akschota—; *Shingar:* Jaoz—; *Spanish:* Nogal—; *Swedish:* Valnoettraed—; *Tamil:* Akrottu—; *Telugu:* Akrotu—; *Turki:* Yanggulk—.

MYRICACEAE.

Trees or shrubs, aromatic and glandular. Leaves alternate; stipules 0. Flowers unisexual, in cylindric bracteate catkin-like spikes, the male spikes sometimes fascicled or panicled, the female always solitary, occasionally a few female flowers at the top of the male spikes. Perianth 0. Male flowers often surrounded by 2 or more bracts; stamens 2-16, usually 4; filaments short, free or connate; anthers erect, 2-celled. Female flowers 2-4-bracteate; ovary 1-celled,

composed of 2 carpels; ovule one, erect; style 2-fid, the arms stigmatose on the inner side. Fruit a small ovoid or globose drupe, succulent, resinous or waxy, endocarp hard.—Genus 1. Species 45. —Temperate and subtropical.

MYRICA Linn.

Characters of the order.

Root bark acrid and astringent, stimulating and anthelmintic.

M. nagi Thunb. is used medicinally in China, *M. cerifera* Linn. in North America, and *M. gale* Linn. in Europe.

1. **Myrica nagi** Thunb. Fl. Jap. (1784) 76.—*M. integrifolia* Roxb.; Wight Ic. t. 764.—PLATE 909B.

A small evergreen tree, bark rough, brownish grey, young shoots petioles and inflorescence tomentose. Leaves crowded towards the ends of the branches, 7.5-12.5 by 2.5-5 cm., narrowly oblong or oblong-lanceolate, narrowed at both ends, entire, glabrous when mature, coriaceous, dotted beneath with minute resinous dots; petiole 7.5-15 mm. long. Male spikes 7.5 mm. long, arranged racemosely on a common axillary stalk 2.5-7.5 cm. long; bracts orbicular, often with 2-3 smaller lateral ones; stamens 3-6. Female spikes axillary, erect, 1.3-2.5 cm. long. Drupe 10 mm. long, ellipsoid, scaly flesh red, composed of spindle-shaped fleshy fibres radiating from the rugose stone.

Distribution: Subtropical Himalaya from the Ravi eastwards, Khasia Hills, Sylhet and south to Singapore.—Malay Islands, China, Japan.

The bark is acrid, bitter, pungent; useful in "vata", "kapha", fever, asthma, urinary discharges, piles, bronchitis, throat complaints, tumours, anæmia, chronic dysentery, ulcers; a good snuff in headache; useful collyrium for opthalmia and other eye diseases (Ayurveda).

The bark has a sharp, bitter, astringent taste; tonic, carminative; useful in inflammations, headache, nasal catarrh, piles, gleet, liver complaints, ozœna, sores, chronic bronchitis, asthma; a good uterine stimulant.—The oil from the flowers is tonic; useful in earache, diarrhœa, inflammation, paralysis (Yunani).

The powdered bark is occasionally used as a snuff in catarrh with headache.

It is also used by Hindus at the present day, mixed with ginger, as a rubefacient application in cholera.

Arabic: Audul, Azuri, Quandol, Udulisk—; *Bengal:* Kaiphal, Kayaphul, Satsarila—; *Bombay:* Kaiphal, Kayaphala—; *Chinese:* Yang Mei—; *Deccan:* Kaephal, Kaiphal—; *English:* Box Myrtle—; *Gujerati:* Kariphal—; *Hindi:* Kaephal, Kaiphal—; *Jaunsar:* Kaphal—; *Khasia:* Dingsolir—; *Kumaon:* Kaphal—; *Malayalam:* Maruta—; *Marathi:* Kayaphala—; *Nepal:* Kobusi—; *North-West Provinces:* Kaiphal, Kaphal, Karphal—; *Persian:* Dareshishamkandul, Darshishaan—; *Punjab:* Kahela, Kahi, Kaiphal, Kaphal—; *Sanskrit:* Aranya, Bhadra, Bhadranjaka, Bhadravati, Kaitarya, Kaphala, Katphala, Kayaphala, Krishnagarbha, Kumbhi, Kumbhipaki, Kumuda, Kumudika, Laghukashmarya, Mahakumbhi, Nasanu, Prachetasi, Purusha, Ramasenaka, Rohini, Shriparnika, Somavriksha, Tvakaphala, Ugragandha—; *Sind:* Kaephal, Kaiphal—; *Tamil:* Marudam—; *Telugu:* Kaidaryamu—; *Urdu:* Kaiphal—.

CASUARINACEAE.

Leafless trees or shrubs; branchlets cylindric, grooved, jointed, internodes terminating in a short sheath of connate subulate scales (leaves). Flowers unisexual; males in terminal spikes formed of short superposed toothed cups; females in ovoid or globose heads, bracteate and 2-bracteolate. Male flowers : Sepals 1 or 2, concave, circumsciss at the base. Stamen 1, inflexed in bud; anther large. Female flowers : Ovary minute, 1-celled; style 2-fid, arms filiform, stigmatose to the base. Ovules 2, collateral, semianatropous. Fruit an oblong or cylindric cone formed of the enlarged hardened bracts and bracteoles, together forming 2-valved cavities enclosing the compressed winged achenes; wing terminal, tipped by the style. Albumen 0; embryo straight, cotyledons flat equal, radicle very short

superior.—Genus 1. Species 35.—Australia, Polynesia; a few Malayan.

CASUARINA Forst.

Leafless trees or shrubs; branchlets cylindric, grooved, jointed, internodes terminating in a short sheath of connate scales (leaves). Flowers unisexual, monoecious or dioecious; males in terminal spikes formed of superposed shortly toothed cups (whorls of bracts); females in ovoid or globose heads, bracteate and 2-bracteolate. Male flowers: Bracteoles 2, lateral, persistent; perianth of 2 hood-shaped segments breaking off at their narrow bases when the solitary stamen expands; filament inflexed in bud; anther large, 2-celled. Female flowers: Perianth 0; ovary 1-celled, composed of 2 carpels; ovules 1-2, ascending; style with 2 filiform stigmas. Fruit of small seed-like compressed nuts produced at the apex into a membranous wing, contained in a woody cone composed of the enlarged bracts and bracteoles, each fruit being contained in a depression closed till ripe by 2 valves.

C. equisetifolia Forst. and *C. sumatrana*. Jung. are used medicinally in the Philippine Islands; *C. equisetifolia* is also used in La Reunion.

1. **Casuarina equisetifolia** Forst. Char. Gen. (1776) 104, t. 52.—PLATE 910.

A large and handsome tree with drooping branches, very slender sulcate branchlets with whorls of 6-8 scale-like leaves, the internodes 5-7.5 mm. long on the branchlets, only 2.5 mm. on main shoots which are tomentose with recurved subulate-setaceous scales 2.5 mm. long and usually 8 in a whorl. Male spikes usually numerous at the ends of the same branches on which the females are borne lower down, 12.5-23 mm. long, slender cylindric or slightly fusiform, bracts subulate with pubescent margins. Female heads in flower only 2.5-3.8 mm. long, ellipsoid, terminating short lateral branchlets below the male branchlets. Fruiting head 13-20 mm. long having a general superficial resemblance to that of a coniferous tree.

Distribution: East side of the Bay of Bengal from Chittagong southwards, cultivated elsewhere in India.—Malay Islands, Australia, Pacific.

The bark is an excellent and often readily available astringent in the treatment of chronic diarrhœa and dysentery. In infusion, it is employed as a tonic.

Bengal: Jau—; *Betsimisaraka:* Filao—; *Bombay:* Sarokajhar, Vilayatisaro—; *Burma:* Pinlekabwe, Tinyu—; *Canarese:* Chabaku, Chabuku, Gali, Kesarike, Sarve, Sura—; *Deccan:* Janglijhau, Janglisaru—; *English:* Australian Oak, Beefwood, Casuarina, She-oak—; *Gujerati:* Vilayatisaru—; *Hindi:* Janglijhau, Janglisaru, Vilayatisaro—; *Ilocano:* Agoo, Aro, Caro—; *La Reunion:* Filao—; *Malay:* Eru, Ru—; *Malayalam:* Aru, Chavakku, Chavukku, Chol, Kattati, Sampirani—; *Marathi:* Janglisaru, Sarova, Sarpuhala, Sura, Suru—; *Mysore:* Kasrike—; *New Caledonia:* Bois de fer—; *Nueva Ecija:* Antong—; *Pampangan:* Agoho—; *Philippines:* Arroo—; *Porebunder:* Juri—; *Sakalave:* Fiofio—; *Seychelles:* Filao—; *Sind:* Jurijur, Mujjun—; *Sinhalese:* Kasa—; *Swahili:* Mvinje—; *Tagalog:* Agoho, Agoo, Agoso, Aguho—; *Tamil:* Sivavarsi, Savukku—; *Telugu:* Chauku, Chavuku, Sarugudu, Saruku—; *Tulu:* Chabuku—; *Uriya:* Jhabuko—; *Visayan:* Agoho, Ayo, Malabohoc—; *Zambales:* Aguso—.

CUPULIFERAE.

Trees rarely shrubs. Leaves alternate, simple, stipules deciduous. Flowers monoecious. Male flowers in catkin-like spikes, rarely in heads; perianth simple, membranous or 0; stamens 2-many, filaments free; anthers 2-celled; pistillode rudimentary and hairy or 0. Female flowers in spikes, heads or solitary; perianth adnate to the ovary or 0, limb when present usually small, annular or dentate; ovary inferior or naked, after fertilization usually more or less perfectly 2-3-celled; ovules solitary or two, collateral, pendulous from, or from near the apex of the cell; styles as many as ovary-cells, short or elongate, connate at the base. Fruit a nut, included within or in the axil of, often greatly enlarged bracts, seed usually one by

abortion.—N. temperate, a few species tropical and in the Southern Hemisphere.

1. Scales of female spikes thin, deciduous .... BETULA.
2. Involucre of many imbricating appressed bracts .... QUERCUS.
3. Female spikes minute, few-flowered, bracts minute, greatly enlarged and convolute in fruit .... CORYLUS.

The Order is astringent.

Glucosides—gaultherin, populin, quercitrin—have been isolated from various members.

OFFICIAL:—*Betula spp.* (Sweden); *B. alba* Linn. (Austria, Japan); *B. lenta* Linn. (Spain, United States); *B. pubescens* Ehrahrt (Germany, Turkey),—Ehrhardt (Switzerland); *B. verrucosa* Ehrahrt (Germany, Turkey),—Ehrhardt (Switzerland).

Fagus silvaticus Linn. (Hungary); *F. sylvatica* Linn. (Holland).

Quercus pedunculata Ehrhardt (Austria, Hungary, Norway, Russia); *Q. robur* Linn. (France, Germany, Sweden, Switzerland),—sub-spec. *pedunculata* var. *vulgaris* De Cand.=*Q. racemosa* Lamk. and sub-spec. *sessiliflora* var. *communis* De Cand.=*Q. robur* Brot. (Portugal); *Q. sessiliflora* Salisbury (Germany),—Smith (Austria, Hungary, Norway, Russia); *Q. sessilis* Ehrhart (Sweden).

BETULA Linn.

Deciduous shrubs or trees; bark white or reddish brown, peeling off in thin papery strips at least in young stems. Leaves serrate, ovate, acute or acuminate. Flowers monoecious. Male flowers in pendulous catkins; bracts peltate with usually 3 bibracteolate flowers; sepals 2-4; stamens 2, filaments forked, separating the anther-cells. Female flowers in erect or pendulous spikes; bracts imbricate, bracteoles 2, adnate to the bract which thus appears 3-lobed; perianth 0; ovary 2-celled, compressed, usually 3 ovaries in the axil of each 3-lobed bract; ovules 1 in each cell; styles 2, slender; stigmas terminal. Fruiting spike of deciduous 3-lobed scales and winged or margined nuts.—Species about 33.—N. temperate regions.

1. Shoots and young leaves pubescent .... 1. *B. utilis.*
2. Shoots and young leaves tomentose .... 2. *B. alnoides.*

Bark astringent.

B. alba Linn. is used medicinally in Europe and North America, *B. chinensis* Maxim. in China, and *B. utilis* D. Don. in Malaya.

OFFICIAL : The oil from *Betula spp.* (Sweden); *B. lenta* Linn. (Great Britain, Spain, United States); *B. alba* Linn. (Austria).

The resin from *B. alba* Linn. (Japan), *B. pubescens* Ehr. and *B. verrucosa* Ehr. (Germany, Switzerland).

1. **Betula utilis** D. Don Prodr. Fl. Nep. (1825) 58.—PLATE 911B.

A small deciduous tree or shrub; bark white with conspicuous long horizontal lenticels the inner layers pink, peeling off in large papery layers; twigs dotted with yellow resinous drops; young shoots, petioles and leaves silky soon becoming glabrous. Leaves 5-10 cm. long, ovate, acute, sharply irregularly serrate, base broadly cuneate or rounded, rarely subcordate, sticky when young with yellow resinous scales; petiole 1-2 cm. long. Male catkins 5-7.5 cm. long, collected at the tips of long shoots. Female spikes about 2.5 cm. long, solitary, erect, terminating dwarf shoots. Fruiting spikes not exceeding 3.8 cm. long; bracts deeply 3-lobed, lobes linear-oblong; fruit narrower than the bracts, the wings narrower than the nut.

Distribution: Temperate Himalaya from Kashmir 7,000—12,000 ft., to Sikkim 9,000—14,000 ft., Bhutan.—Japan, Afghanistan.

The bark is acrid, pungent, heating; tonic, alexiteric; useful in convulsions, bronchitis, diseases of the blood and the ear, leprosy, "tridosha" (Ayurveda).

The bark is good for earache (Yunani).

The decoction of the bark is used as a wash in otorrhoea and poisoned wounds.

The infusion of the bark is used as a carminative; it is prescribed also in hysteria. It has also certain aromatic and antiseptic properties.

In Malaya, the bark is used in the form of decoction for jaundice and bilious fevers.

The bark is not an antidote to snake-venom (Mhaskar and Caius).

Almora: Bhojpattar—; *Bhutia:* Takpa—; *Bombay:* Bhojpatra, Bhurjapatra—; *Cutch:* Bhujapatra—; *Eastern Himalaya:* Phuspat—; *Garhwal:* Bhuj—; *Gujerati:* Bhojapatra—; *Hindi:* Bhejpattra, Bhujpatar, Bhujpattra—; *Jaunsar:* Bhuj—; *Kumaon:* Bhuj—; *Kunawar:* Shak, Pad—; *Lepcha:* Sanglikung—; *Malaya:* Khan phie—; *Nepal:* Bhujapat—; *North-Western Himalayas:* Bhuj, Bhujpattra, Burj—; *Punjab:* Bhuj, Burj, Burzal, Phurz—; *Sanskrit:* Bahulavalkala, Bahupata, Bahutvaka, Bhuja, Bhurja, Bhurjapatra, Bhurjapatraka, Bhutaghna, Bindupatra, Charmi, Charmmadruma, Chhadapatra, Chhatrapatra, Chitratvaka, Dalanismoka, Mriducharmi, Mridupatra, Mridutvaka, Padmaki, Patrapushpaka, Rakshapatra, Shailendrastha, Shitri, Sthirachhada, Sucharma, Valkadruma, Vichitraka, Vidyadala—; *Telugu:* Bhujapatri—; *Urdu:* Bhurjapattra—; *Western Himalayas:* Pad, Phatak, Shag, Shak, Takpa—.

2. **Betula alnoides** Ham. in Don Prodr. 58; Brandis For. Fl. 458, t. 56.

A moderate-sized tree, wood grey, the outer bark peels off in thick rolls, the lenticels shorter than in *B. utilis,* branchlets and underside of young leaves softly pubescent, root-suckers and luxuriant shoots densely tomentose. Leaves ovate to ovate-lanceolate, serrate, teeth cuspidate, often aristate. Bracts of male catkins pubescent, with 3 diandrous flowers on the midrib, perianth of 4 hairy linear leaves. Female spikes panicled, nuts with a wing much broader than nut, bracts in fruit membranous, narrower than the wings of the nut, with 2 obtuse or acute teeth or short lobes.

Distribution: Himalaya from the Sutlej eastwards, 5,000—10,000 ft., Khasia Hills, Manipur, hills of Upper and Lower Burma.—China.

The plant is said to be used as a snake-bite remedy.

Quercus Linn.

Trees or shrubs, (in the indigenous species) evergreen. Leaves alternate, penniveined. Flowers monoecious. Male flowers in pendulous catkins, bracts small, 1-flowered; perianth campanulate, 4-8-lobed or -partite; stamens usually 6-12, filaments slender, scarcely exceeding the perianth; pistillode usually 0. Female flowers with

an involucre of small scales, solitary, axillary or in few-flowered spikes; perianth-tube adnate to the ovary, limb very minutely lobed or toothed; staminodes minute or 0; ovary 3-celled; ovules 2 in each cell; styles 3, stigmatose on the inner surface or at the apex only. Fruit (acorn) a 1-seeded nut seated on a cup formed from the enlarged and hardened involucral scales.—Species 300.—N. temperate, Indo-Malaya, Pacific coasts.

1. Leaves oblong or ovate-lanceolate, acuminate, mucronate-serrate, densely tomentose beneath	1.	*Q. incana.*
2. Leaves from broadly oblong to lanceolate-acuminate, cuspidately serrate, glabrous and glaucous or pubescent beneath ..	2.	*Q. lamellosa.*
3. Leaves petioled, very coriaceous, elliptic or elliptic-lanceolate, caudate	3.	*Q. pachyphylla.*

Powerfully astringent.

The following species are used medicinally in Europe—*Q. ilex* Linn., *Q. robur* Linn., *Q. suber* Linn.—; in Asia Minor and Malaya —*Q. lusitanica* Linn.—; in China—*Q. bungeana* Forbes, *Q. dentata* Thunb., *Q. glauca* Thunb.—; in North America—*Q. alba* Linn., *Q. discolor* Ait., *Q. falcata* Mich., *Q. velutina* Lam., *Q. virginiana* Mill.—.

Official:—The bark of *Q. pedunculata* Ehrhardt (Austria, Hungary, Russia), *Q. robur* Linn. (France, Germany, Sweden, Switzerland), *Q. sessiliflora* Salisbury (Germany), *Q. sessilis* Ehrhart (Sweden).

The bark and acorn of *Q. pedunculata* Ehrhardt (Norway), *Q. robur* Linn. sub.-spec. *pedunculata* var. *vulgaris* De Cand.= *Q. racemosa* Lamk. and sub.-spec. *sessiliflora* var. *communis* De Cand. =*Q. robur* Brot. (Portugal), *Q. sessiliflora* Smith. (Austria, Hungary, Norway, Russia).

1. **Quercus incana** Roxb. Hort. Beng. (1814) 113.—Plate 912.

An evergreen tree, bark dark grey, young shoots and petioles hoary. Leaves 7.5-15 by 2.5-5 cm., oblong- or ovate- lanceolate, acuminate, cuspidate-serrate, coriaceous, dull greyish green and glabrous above, densely white-tomentose beneath; lateral nerves 12-20 pairs, straight, parallel; petiole 10-15 mm. long. Male catkins

5-10 cm. long, slender, pubescent, usually interrupted; anthers 3-5, glabrous. Female flowers solitary or clustered in the leaf-axils on short stout peduncles; styles short, clavate, spreading. Acorn 2 cm. long, half-enclosed by the campanulate cup when ripe.

Distribution: Temperate Himalaya from the Salt Range and Murree to E. Nepal, 4,500—7,500 ft., Upper Burma.

The acorns form the medicine known in the Punjab bazars as balut. They are given as a diuretic in gonorrhœa, and also as an astringent in indigestion, diarrhœa especially of children, and in asthma. Before being administered, they are usually buried in the earth to remove their bitter principle, then washed and lastly ground; dose 3 *mashas* (Stewart).

Chaturvedi and Watson have examined numerous samples of wood for their tannin content (*Journ. Ind. Chem. Soc.*, 1926).

English: Grey Oak, Himalayan White Oak, Kumaon Oak—; *Garhwal:* Banj—; *Hazara:* Rhin, Rin, Rinj—; *Hindi:* Ban, Banj—; *Jaunsar:* Ban—; *Jhelum:* Rhin, Rin, Rinj—; *Kashmir:* Shiddar, Silasupari—; *Kumaon:* Ban, Banj—; *Punjab:* Ban, Banj, Daghunban, Kharpataserei, Kharshu, Maru, Rin, Rinj, Shindar, Vari—.

2. **Quercus lamellosa** Smith in Rees Cycl. XXIX, no. 23.—Plate 912A.

A very large evergreen tree; wood very hard and heavy. Buds silky, young shoots with tawny deciduous pubescence. Leaves elongate-elliptic, acute at both ends, sharply serrate to near the base, upperside glabrous, underside glaucous, with deciduous pubescence while young; blade 20-45 cm., petioles 2.5-5 cm. long, secondary nerves 18-25 pairs, straight, impressed on the upper, very prominent on the underside. Fruit sessile on short spikes; peduncles thick; cup very large, up to 7.5 cm. across, woody, with 10 thin broad loose lamellae, enclosing the greater part of the nut.

Distribution: Nepal, Sikkim, Bhutan, Manipur.

The bark and acorns are used as astringents.

Lepcha: Buk—; *Nepal:* Budgrat, Bajraugt, Bujrat, Pharatsinghali, Shalshi—.

3. **Quercus pachyphylla** Kurz. in Journ. As. Soc. Beng. II (1875) 197, t. 14, f. 1-4.—Plate 913.

A large tree. Leaves elliptic-lanceolate, long-acuminate, glabrous above, underside pale, with minute stellate hairs, midrib and nerves glabrous, blade 12.5-20 cm., petioles 8 mm., secondary nerves 8-10 pairs, impressed above, arching and anastomosing under the margin. Spikes sometimes androgynous. Cups 3.8-5 cm. across, always confluent, forming large irregularly shaped masses, nuts glabrous shining, nearly globose, almost entirely included.

Distribution: Sikkim, Manipur.

The bark and acorns are used as astringents in Sikkim.

Lepcha: Hlosiri, Kashok, Songpong, Srikung—; *Nepal:* Barakatus, Singorikatus, Sungrekatus—.

Corylus Linn.

Deciduous monoecious trees or shrubs, flowering before leafing. Leaves alternate, doubly serrate, plicately penninerved. Male flowers solitary in the bracts of a many-flowered pendulous spike, 2-bracteolate; perianth 0; stamens 4-8, filaments forked, separating the anther-cells. Female flowers in pairs in the upper bracts of a minute few-flowered many-bracteate spike or head, bracteole solitary 3-partite; perianth superior, limb annular, toothed; ovary 2-celled, cells 1-ovuled; style-arms linear. Nut large, woody or bony, enclosed in the greatly enlarged coriaceous bracts, 1-seeded.—Species 8.—N. temperate.

C. avellana Linn. is used medicinally in Europe and China.

1. **Corylus colurna** Linn. Sp. Pl. (1753) 999.—Plate 914.

A small or medium sized deciduous tree, bark dark grey, thin. Leaves alternate, 7.5-20 by 6.3-12.5 cm., ovate or obovate, acuminate, irregularly and sharply lobulate and toothed, base cordate, thin, membranous, glabrous when mature except in the axils of the nerves on the lower surface; lateral nerves 10-12 pairs, the lowest pair basal; petiole 2.5-3.8 cm. long, pubescent and with gland-tipped hairs. Flowers monoecious, appearing before the leaves. Male flowers

solitary in the axils of obovate acute bracts, arranged in drooping catkins 5-7.5 cm. long, the catkins in short racemes of about 4-6; bracteoles 2, adnate to the bract; perianth 0; stamens usually 8; filaments short, more or less connate, anthers 1-celled. Female flowers very minute, in small sessile bud-like spikes composed of numerous imbricate bracts, the flowers in pairs in the axils of a few of the uppermost bracts; bracteole solitary, 3-partite; perianth-tube adnate to the ovary, limb annular toothed; ovary 2-celled; ovules one in each cell; style-arms two, linear, red. Fruit a 1-seeded nut 13-18 mm. long, sheathed by the much enlarged lobed and toothed glandular-hairy bracteole and supported by large laciniate bracts, the nuts usually in clusters.

Distribution: W. temperate Himalaya from Kashmir to Kumaon, 5,500—10,500 ft.—Asia Minor, Thrace and Hungary.

The nuts are used as a tonic.

Chamba: Thangi, Thankoli, Warawi, Wiri, Wuriya—; *Chenab:* Jangi—; *Garhwal:* Kabasi, Shirol—; *Hindi:* Bhutiabadam—; *Jaunsar:* Kapasi, Sharori—; *Jhelum:* Urni—; *Kangra:* Jhangi—; *Kashmir:* Thangi, Thankoli, Warawi, Winri, Wiri, Wuriya—; *Kumaon:* Bhotiabadam, Kapasi—; *Sutlej:* Bandilla, Banpalu, Geh, Sharoli, Shurli—.

SALICACEAE.

Deciduous trees or shrubs. Leaves alternate, simple. Flowers dioecious or exceptionally monoecious, both sexes in catkins consisting of bracts each with one flower in its axil; bracteoles 0. Perianth 0. Disk of one or more glands or cup-shaped. Male flowers: Stamens 2 or more, filaments usually free; pistillode 0. Female flowers: Ovary 1-celled; ovules few or many on 2-4 parietal or subbasal placentas; style short or 0; stigmas notched or lobed. Fruit an ovoid or lanceolate 2-4-valved capsule. Seeds minute enveloped in a mass of silky hairs attached to the funicle.—Genera 2. Species 180.—N. temperate, tropical and subtropical.

1. Disk of 1 or 2 separate glands .... SALIX.
2. Disk cupular or annular .... POPULUS.

Bark bitter and febrifuge.

Salicin occurs in the bark and leaves of many species of SALIX and POPULUS. Salinigrin has been found only in *S. discolor* Muhl.

Populin occurs in the bark and leaves of the aspen and other poplars.

OFFICIAL :—Salicin (Great Britain, United States).

Populus spp. (Great Britain, United States); *P. nigra* Linn. (Belgium, France, Turkey); *P. nigra* Linn. var. α-genuina De Cand. =*P. Pannonica* Kit. (Portugal).

Salix spp. (Great Britain, United States); *S. alba* Linn. (Portugal),

SALIX Linn.

Deciduous trees or shrubs, sometimes dwarf. Leaves alternate (very rarely opposite), simple, usually lanceolate; stipules various. Flowers in catkins, dioecious (or sometimes monoecious with male and female flowers in the same catkin), each flower in the axil of a bract; perianth 0. Disk usually of 1-2 glands; when one, usually opposite the bract and when 2 are present, one opposite and one adjacent to the bract. Stamens 1-12, usually 2, filaments free or connate at the base or united up to the anthers. Ovary 1-celled, sessile or stipitate; style usually short or 0; stigmas entire, lobed or divided; ovules few or many, on parietal placentas towards the base of the ovary. Capsule 2-valved, when ripe the valves usually rolled back; seeds with a tuft of silky hairs.—Species 160.—Cosmopolitan.

1. Leaves petioled, narrowly or broadly ovate-lanceolate, acuminate, serrulate .... 1. *S. tetrasperma.*
2. Leaves linear-lanceolate, upper caudate-acuminate, quite entire or serrulate .... 2. *S. acmophylla.*
3. Leaves ultimately glabrous and more or less rugose above, more or less grey-tomentose beneath, crenate or nearly entire 3. *S. caprea.*
4. Leaves lanceolate, broadest a little above the middle; silky when young, glabrous when mature, often glaucous beneath, glandular-denticulate .... 4. *S. alba.*
5. Leaves linear-lanceolate, acuminate, finely serrulate, glabrous or sparsely hairy beneath, hairy when quite young .... 5. *S. babylonica.*

Bark bitter, astringent, and antipyretic.

The following species are used medicinally in Europe *S. alba* Linn., *S. caprea* Linn., *S. cinerea* Linn., *S. fragilis* Linn., *S. pentandra* Linn., *S. viminalis* Lin.—; in China—*S. babylonica* Linn., *S. purpurea* Linn.—; in North America—*S. alba* Linn., *S. discolor* Muhl., *S. fragilis* Linn., *S. nigra* Marsh.—; in Southern Africa—*S. capensis* Thunb.—.

OFFICIAL:—The bark of *S. alba* Linn. in Portugal.

In Great Britain and the United States of America, various species are recognized as a source of salicin.

1. **Salix tetrasperma** Roxb. Corom. Pl. I (1795) 66, t. 97.—PLATE 915.

A medium sized tree, bark with longitudinal furrows rough, young shoots silky. Leaves 5-12.5 by 1.5-4.5 cm., lanceolate or ovate-lanceolate, caudate-acuminate, towards the base of the shoots usually shorter, blunter and relatively broader, entire or more usually serrulate, green and glabrous above, pale or white beneath and more or less silky when quite young; petioles 7.5-18 mm. long; stipules on vigourous shoots semicordate, conspicuous, with gland-tipped teeth. Flowers appearing after the leaves. Male catkins 5-12.5 cm. long, sweet-scented, sessile or on leafy shoots, rhachis hairy; bracts obovate, concave, yellowish brown, villous, not crowded, tip rounded or sub-acute. Stamens 5-10, filaments free, woolly towards the base. Disk of 2 yellow glands. Female catkins 2.5 cm. long, on leafy shoots, rhachis hairy, bracts as in the male but rather smaller. Disk semi-annular opposite the bract, yellow. Ovary ovoid; style 0; stigma 2-fid, each branch 2-lobed. Fruiting catkins about 5 cm. long, rather lax; capsules glabrous, 3.8-5 mm. long, on a slender distinct stipe.

Distribution: Throughout tropical and subtropical India.—Sumatra and Java.

The bark is used as a febrifuge.

Assam: Bhe, Bhi—; *Badaga:* Bayike, Bayise—; *Bengal:* Boishaki, Panijama—; *Bombay:* Bacha, Baishi, Bed, Wallunj—; *Burma:* Momaka, Yene—; *Canarese:* Bayike, Bayise, Niranji, Niruvanji, Nirvanji—; *Central Provinces:* Dhanie—; *Dehra Dun:* Bed, Jalmala—; *Garo:* Bhesh—; *Hazara:* Bins—; *Hindi:* Baings,

Bains, Baishi, Bed, Bend, Bet, Bhainsh, Bilsa, Laila—; *Kashmir:* Yir—; *Kolami:* Nachal—; *Kumaon:* Bhains, Gadhbhains—; *Malay:* Dahu, Dalu dalu, Jendalu—; *Malayalam:* Arali, Attupala, Nirunji, Vanji, Vanti—; *Marathi:* Bach, Bitasa, Bitsa, Boch, Bocha, Walunj—; *Muduva:* Nirvanji—; *Nasirabad:* Bedsafaida—; *North-West Provinces:* Bains, Laila—; *Oudh:* Bilsa, Birsa—; *Punjab:* Badha, Bakshel, Bed, Bedleila, Beis, Bida, Bidu, Bin, Bis, Bitsa, Magsher, Safedar—; *Sanskrit:* Varuna—; *Santal:* Gadasigrik—; *Saora:* Iroda, Kondaganneru, Vodime—; *Sind:* Badha, Bitsa, Sufaida—; *Tamil:* Attuppalai, Niruvanji, Suvedam, Vanji—; *Telugu:* Etipala, Etipisinika—; *Uriya:* Baisi, Barija, Panijamo—.

2. **Salix acmophylla** Boiss. Diagn. ser. 1, VII (1846) 98. —Plate 916.

A small tree, bark rough with irregular mainly vertical cracks. Twigs slightly hairy when quite young. Leaves 5-12.5 cm. by 5-15 mm., rarely wider, linear-lanceolate, caudate-acuminate, entire or serrulate, green and glabrous above, not glaucous beneath, silky when quite young; petioles 2.5-7.5 mm. long; stipules minute. Flowers appearing after the leaves. Male catkins 2.5-5 cm. long, on short leafy shoots, rhachis villous; bracts ovate or oblong, concave, yellowish, very villous, rather crowded, tip rounded or subacute. Stamens 4-6, usually 6, filaments free, woolly towards the base. Disk of 2 yellow glands. Female catkins 2.5 cm. long, on short leafy shoots, rhachis villous, bracts as in the male. Disk opposite the bract, semi-annular, yellow, about $^1/_3$ as long as the stipe of the ovary. Ovary fusiform; style 0; stigma two-fid, branches entire. Fruiting catkins 2.5-5 cm. long; capsules glabrous, about 5 mm. long, on a slender distinct stipe.

Distribution: N.-W. India, Baluchistan.—Afghanistan and westwards to Syria.

A decoction of the bark is used in Baluchistan as a febrifuge (Murray).

Afghanistan: Bed, Bedh—; *Chagai:* Get—; *Dehra Dun:* Bada, Bed—; *Kumaon:* Bhains, Gadhbhains—; *Nushki:* Gaith—; *Punjab:* Bed, Jalmala—; *Hindi:* Bada, Bed—; *Jhalawan:* Gait—; *Kharan:* Bada, Bed, Bisu—; *Sind* : Budha—; *Zhob* : Wulla—.

3. **Salix caprea** Linn. Sp. Pl. 1020.—PLATE 917.

A small tree, usually grown as a shrub for its sweet scented male flowers. Leaves 5-10 cm. long, ultimately glabrous and more or less rugose above, more or less grey-tomentose beneath, crenate or nearly entire; stipules usually conspicuous, subreniform. Flowers before the leaves. Male catkins 2.5-3.8 cm. long, sessile, stout, densely silky; bracts elliptic, acute, dark brown, with long silky hairs. Stamens 2, filaments free, glabrous; disk-gland solitary. Female catkins a little shorter than the male, longer in fruit. Capsule downy, stipitate.

Distribution: Cultivated in Rohilkhand and N.-W. India.—W. Asia, Europe.

The plant has a sharp bitter taste; cooling to the brain; useful in pain and inflammation of the liver, thirst, biliousness, headache; aphrodisiac.—The juice of the leaves has the properties of the plant; astringent, expectorant, laxative; useful in fevers, tremors in the limbs, muscular pain, ophthalmia, enlargement of the spleen.—The fruit is useful in biliousness, in inflammation of the eye due to injury (Yunani).

The Persian settlers in India have introduced the flowers (bedmushk) and the distilled water (ma-el-khilaf) of *S. Caprea,* both of which are used by the upper classes of Mahometans and Parsees, who consider them to be cephalic and cardiacal and use them as domestic remedies in almost every kind of slight ailment. Raughan-i-bed, an oil prepared by boiling two parts of the distilled water with one of sesamum oil until the water has all evaporated, is a favourite remedy for cough (Dymock).

A decoction of the leaves is given in fevers.

The distilled water from the flowers is highly valued as a medicine, being cordial, stimulant, and aphrodisiac, and is externally applied in headache and ophthalmia. The ashes of the wood are useful in hæmoptysis, and, mixed with venegar, applied to hæmorrhoids. The stem and leaves are astringent, and the juice and gum are also used medicinally to increase visual powers (Stewart).

Arabic: Khilaf—; *Dutch:* Water wilg, Wilg—; *English:* Goat

Willow, Sallow—; *French:* Boursault, Marsault, Marseau, Marsot, Saule marceau, Saule marseau—; *German:* Palmweide, Sahlweide—; *Hindi:* Bedmushk—; *Persian:* Bedibalkhi—; *Punjab:* Bedmushk—; *Pushtu:* Khwagawala—; *Roumanian:* Iov—; *Urdu:* Bedmishk—.

4. **Salix alba** Linn. Sp. Pl. 1021.—Plate 918A.

A fairly large tree, young twigs silky-hairy. Leaves 6.3-10 cm. long, lanceolate, broadest a little above the middle, silky when young, glabrous when mature, often glaucous beneath, glandular-denticulate; petiole 7.5-12.5 mm. long. Flowers after the leaves. Male catkins 2.5-5 cm. long on leafy peduncles; bracts oblong, ciliate, yellow. Stamens 2, filaments free, villous at the base; disk-glands 2. Female catkins a little longer than the male. Capsules glabrous, subsessile; style short; stigmas thick 2-lobed.

Distribution: Cultivated in N.-W. Himalaya.—Europe, N. Asia.

The bark is tonic, antiperiodic, and astringent. The decoction is given in febrile diseases of rheumatic or gouty origin, also in diarrhœa and dysentery.

Afghanistan: Bedisiah—; *Catalan:* Salits blanchs, Saula—; *Danish:* Huid piil—; *Dutch:* Witte wilg—; *English:* Huntingdon Willow, White Willow—; *French:* Osier blanc, Plon blanc, Saule, Saule blanc—; *German:* Dotterweide, Faelber, Felber, Fieberweide, Knak, Kneien, Silberweide, Weide, Weissfelber, Welge—; *Greek:* Itea—; *Italian:* Salcio, Salcio bianco—; *Kashmir:* Vivir—; *Malta:* Common Willow, Salcio, Zafzafa—; *Portuguese:* Salgueiro, Salgueiro branco—; *Punjab:* Bis, Bushan, Chamma, Changma, Chung, Kalchan, Malchang, Madana, Yur—; *Roumanian:* Salcie—; *Russian:* Iva, Verba—; *Spanish:* Salce, Salce blanco, Sauce, Sauce blanco—; *Swedish:* Hvit pihl—; *Trans-Indus:* Kharwala—.

5. **Salix babylonica** Linn. Sp. Pl. 1017.—Plate 918B.

A medium sized tree with pendulous branchlets. Leaves 7.5-18 by 1-2.5 cm., linear-lanceolate, acuminate, finely serrulate, glabrous or sparsely hairy beneath, hairy when quite young; petiole 5-7.5 mm. long. Flowers with the leaves. Male catkins 1.3-2.5 cm. long on short leafy peduncles, silky; bracts small, pale. Stamens 2,

filaments free, villous at the base; disk-glands 2. Female catkins as long as the male, slender. Capsule sessile, glabrous; style 0; stigmas spreading, rather large, usually entire.

Distribution: Cultivated in the plains of India and the Himalaya up to 9,000 ft. and elsewhere in gardens.—Europe, N. and W. Asia.

The leaves and bark are considered tonic, possibly from the salicine in them. They are much used by native practitioners as astringents and tonics, chiefly in the treatment of intermittent and remittent fevers.

The bark is also said to be anthelmintic.

Burma: Momaka, Momakha—; *Catalan:* Desmay—; *Chinese:* Liu—; *Dutch:* Treuwilg—; *English:* Weeping Willow—; *French:* Garb, Paradis des Jardiniers, Parasol de grond seigneur, Saule de Babylone, Saule pleureur—; *German:* Trauerweide—; *Hindi:* Majnun—; *Hova:* Hazomalahelo—; *Italian:* Salice piangente—; *Kashmir:* Bisa, Giur—; *Nepal:* Bhosi, Tissi—; *Portuguese:* Salgueiro chorao—; *Punjab:* Bada, Bed, Bedmaju, Besu, Bidai, Bisa, Bitsubes, Katira, Laila, Majnum, Majnum, Wala—; *Roumanian:* Salcie pleteasa—; *Russian:* Plakuchaya iva—; *Spanish:* Arbol del desmayo, Desmayo, Lloron—; *Telugu:* Attuppalai—.

POPULUS Linn.

Deciduous trees often with sticky buds. Leaves alternate, 3-5-nerved at the base, often lobed; stipules narrow, membranous, fugacious. Flowers in catkins, dioecious, pedicellate in both sexes, each flower in the axil of a bract; perianth 0. Disk cup-shaped, membranous or fleshy, often oblique, entire, toothed or lobed. Stamens 4 to many; filaments free. Ovary 1-celled, surrounded at the base or up to ¾ of its length by the disk; stigmas 2-4; ovules many, on 2-4, parietal placentas. Capsules 2-4-valved, a placenta along the centre of each valve, valves spreading; seeds minute, with a long dense tuft of silky hairs.—Species 20.—N. temperate.

1. Leaves broadly ovate-rhomboid, nearly as broad as long, glabrous, crenate-acuminate .... 1. *P. nigra.*
2. Leaves broadly ovate-acuminate, crenate-serrulate; teeth minutely ciliate; base usually cordate .... 2. *P. ciliata.*

3. Leaves dimorphic .... 3. *P. euphratica.*
4. Leaves ovate, with obtuse sinuate lobes, or those of luxuriant shoots 3-5-lobed, persistently cottony-tomentose beneath .... 4. *P. alba.*

Aromatic bitter, tonic, febrifuge, diuretic, antiscorbutic, resolvent, and vulnerary.

The following species are used medicinally in Europe—*P. alba* Linn., *P. balsamifera* Linn., *P. nigra* Linn., *P. pyramidalis* Salisb., *P. tremula* Linn.—; in China—*P. suaveolens* Fisch., *P. tremula* Linn.—; in North America—*P. balsamifera* Linn., *P. tremula* Linn., *P. tremuloides* Michx.—; in South Africa—*P. canescens* Sm. var. *rossii*—.

OFFICIAL:—The flower buds of *P. nigra* Linn. in Belgium, France, Turkey.

The stems and the exudation from the stems of *P. nigra* Linn. var. *α-genuina* De Cand. (*P. Pannonica* Kit.) in Portugal.

In Great Britain and the United States of America, various species are recognized as a source of salicin.

1. **Populus nigra** Linn. Sp. Pl. 1034. var. *pyramidalis* Spach. —PLATE 919A.

A large tree with fastigiate branches forming a narrow cylindric crown, buds sticky. Leaves 5-10 cm. long, broadly ovate-rhomboid, nearly as broad as long, glabrous, crenate, acuminate; petiole 2.5-6.3 cm. long. Male catkins up to 7.5 cm. long; bracts purplish; stamens 6-30, anthers purple. Female catkins up to 10 cm. long; stigmas 2, sessile, broad, obcordate. Capsule shortly pedicellate.

Distribution: Planted in the N.-W. Himalaya, Punjab, Baluchistan.—The type is indigenous to Europe, Central and W. Asia.

A liquor extracted from the bark is considered depurative in the Punjab (Stewart).

In Tuscany, an ointment prepared from the buds is used for hæmorrhoids, and the balsam obtained from the same source is a popular remedy for colds.

Afghanistan: Kabuda, Safeda, Safedar—; *Catalan:* Abre poll, Alba negre, Poll, Pollanera—; *Danish:* Sorte popeltrae—; *Dutch:* Zwarte popelier—; *English:* Black Poplar, Lombardy Poplar—;

French: Bouillard, Léard, Liard, Liardier, Peuple, Peuplier, Peuplier franc, Peuplier noir, Peuplier pyramidal, Popelier—; *German:* Bellen, Pappel, Salbeibaum, Schwarzpappel—; *Greek:* Egeeros—; *Italian:* Albaro, Gattero, Oppio, Pioppo nero—; *Kashmir:* Frast—; *Ladak:* Changma, Kabul, Kaull, Yarpa, Yulatt—; *Languedoc:* Biouté, Pibou, Piboul, Piboulo—; *Polish:* Osika, Topola czarma—; *Portuguese:* Alamo, Choupo—; *Punjab:* Biuns, Do, Farsh, Frast, Kramali, Makkal, Pakhshubut, Prost, Sufeda, Sufedar—; *Roumanian:* Plop—; *Russian:* Ossokor—; *Servian:* Topol—; *Spanish:* Alamo negro, Chopo—; *Swedish:* Flugtraed, Poppelpihl—; *Tartary:* Aksha—; *Turkish:* Karakavak—.

2. **Populus ciliata** Wall. Cat. (1828) no. 2796.—PLATE 920.

A large tree, bark greenish grey, smooth on young stems, brown with deep vertical fissures on old stems, buds sticky. Leaves 7.5-18 by 6.3-12.5 cm., broadly ovate, acuminate, crenate-serrulate, teeth minutely ciliate, base usually cordate, 3-5-nerved, pale and often minutely pubescent beneath; petiole 5-12.5 cm. long. Catkins compact in flower, male 7.5-10 cm. long, female in fruit lax, 15-30 cm. long. Male flowers: Bracts oblanceolate, fringed with long hairs; disk obliquely cup-shaped crenulate; stamens many, anthers oblong, longer than the filaments. Female flowers: Disk embracing half the ovary, margin undulate; stigmas 3-4, very large obcordate. Capsule 7.5-10 mm. long, broadly ovoid, 3-4-valved; pedicels 2.5-10 mm. long. Seeds enveloped in long silky hairs.

Distribution: Temperate Himalaya, 4,000—10,000 ft., from Kashmir to Bhutan.

The bark is occasionally used as a tonic stimulant and purifier of the blood (Atkinson).

Bashahr: Chum, Krammal—; *Garhwal:* Syan—; *Hazara:* Palach—; *Hindi:* Paharipipal, Sharphara, Tilaunja—; *Jamsar:* Biaon, Kapasipipla, Sharphara, Tilaunja—; *Kashmir:* Falsch, Palach—; *Kumaon:* Chalmya, Chan, Chauniya, Garpipal—; *Lepcha:* Sungribong—; *Nepal:* Bangikat—; *Punjab:* Asan, Bagnu, Banfrastu, Chalon, Chalonwa, Chanum, Dudfrass, Falis, Falsh, Flassu, Kramali, Krambal, Krammal, Pabe, Paharipipal, Palach,

Paluch, Phalja, Rikkan, Saki, Shawa, Suali, Sufedar, Sulali, Supida, Tallon, Talung—; *Pushtu:* Shodar—; *Simla:* Chelaun, Chelun—; *Western Himalayas:* Bagnu, Banpipal, Chalni, Chelaun, Paharipipal, Piplas, Safeda—.

3. **Populus euphratica** Oliv. Voy. III (1801) 449, t. 45, 46.—PLATE 921.

A large tree, bark on old stems thick rough, extremities sometimes hoary. Leaves on mature shoots 5-7.5 cm. long, very variable, usually broader than long rhomboid -orbicular or -ovate, sharply lobulate in the upper half, base 3-5-nerved; petiole 1.3-5 cm. long, rather slender, usually with two large glands one on either side at the top; juvenile leaves 7.5-15 cm. by 6-13 mm., narrowly oblong, usually entire, the two surfaces similar; petiole usually 7.5-15 mm. long. Catkins lax, nodding, male 2.5-5 cm. long, female 5-7.5 cm. long. Male flowers: Bracts oblanceolate, incised; disk orbicular, on a long slender stipe, flat, 8-cleft; stamens 8-12, anthers oblong, quadrangular, longer than the filaments. Female flowers: Disk membranous, caducous, tubular, with 8-12 linear segments; stigmas 2-3, more or less crescent-shaped, narrowed into short styles. Capsules 7.5-10 mm. long, ovoid-lanceolate; pedicels 3.8-5 mm. long. Seeds enveloped in silky hairs.

Distribution: Sind, Punjab, N.-W. Himalaya, up to 13,500 ft.—Central Asia, westwards to Syria and Egypt.

The bark is used as a vermifuge in the Punjab and Sind (Stewart).

Afghanistan: Pada, Padak—; *Baluchistan:* Padar—; *Bombay:* Ban, Bahan—; *Brahui:* Patki—; *Fort Sandeman:* Spina—; *Gundava Pass:* Putki—; *Hebrew:* Bhakaim—; *Jhalawan:* Patk—; *Kharan:* Patk—; *Kila Saifulla:* Spina—; *Kohlu:* Spana—; *Ladak:* Hodung, Hotung—; *Las Bela:* Bahanr—; *Nasirabad:* Bahan, Spina—; *Pishin:* Pada—; *Punjab:* Bahan, Benti, Bhan, Bhani, Junglibenti, Labhan, Safedar, Sperawan—; *Pushtu:* Bahan—; *Quetta:* Pada—; *Sarawan:* Patk—; *Shah Bilawul:* Bahun—; *Sibi:* Bahun, Spina—; *Sind:* Bahan, Bhan, Safeda—.

4. **Populus alba** Linn. Sp. Pl. (1753) 1034.—PLATE 919B.

A large tree, bark light grey or whitish, smooth on young stems, dark and very rough on old stems, young shoots petioles and leaves beneath with dense soft cottony tomentum. Leaves 5-10 cm. long, ovate, with obtuse sinuate lobes or those of luxuriant shoots 3-5-lobed and usually broader than long, when young cottony on the upper surface, persistently cottony-tomentose beneath, base 3-5-nerved; petiole 2.5-5 cm. long. Catkins hairy, the male 5-10 cm. long, the female shorter. Male flowers: Bracts oblanceolate, ciliate, the tips slightly toothed; disk small; stamens 6-10. Female flowers: Bracts as in the male; disk cup-shaped, crenulate; stigmas apparently 4 (actually 2, two-partite). Capsule 6 mm. long, shortly pedicellate, 2-valved.

Distribution: N.-W. Himalaya.—W. Siberia, Syria, Asia Minor, Europe, N. Africa.

The bark is a tonic. It is used to purify the blood and in skin diseases. It is said to be useful in strangury.

Afghanistan: Speda, Spelda, Sperdor—; *Catalan:* Ilba, Alba blanch, Alba cotoner, Alba ver—; *Chaman:* Spedar—; *English:* Able, White Poplar—; *French:* Blanc de Hollande, Franc picard, Ipréau, Obeau, Obel, Peuplier blanc, Ypréau—; *German:* Alberbaum, Pappel, Weissbaum, Weisspappel—; *Jhalawan:* Ispedar—; *Kashmir:* Fras—; *Languedoc:* Aouba—; *Malta:* White Poplar, Alberaccio, Alberello, Gattice, Luk—; *Nasirabad:* Spedar, Sufeda—; *Pishin:* Spedar—; *Punjab:* Baid, Chanuni, Chitabagnu, Fras, Janglifrast, Mal, Prasti, Prist, Rikkan, Safeda, Sannan—; *Quetta:* Spedar—; *Russian:* Topol—; *Shahrig:* Spedar, Sufeda—; *Sibi:* Spedar, Sufeda—; *Spanish:* Alamo blanco—; *Western Himalayas:* Chittabagun, Safeda—.

CERATOPHYLLACEAE.

Submerged slender fragile branched herbs. Leaves whorled, dichotomously cleft into filiform minutely toothed lobes; stipules 0. Flowers minute, monoecious, axillary, sessile. Male flowers solitary.

Perianth (or involucre) of 6-12 narrow subvalvate 2-fid segments. Stamens 20-30; filaments very short; anthers erect, extrorse, dehiscing longitudinally; connective truncate or 2-toothed at the apex. Female flowers: Perianth of the male. Ovary sessile, ovoid, 1-celled; ovule solitary, pendulous, orthotropous; style subulate, stigmatic on one side. Fruit a small coriaceous ovoid or ellipsoid somewhat compressed nutlet, terminating in a long subulate style with a spur projecting from the base on either side. Seed pendulous; testa membranous; albumen 0; embryo straight; cotyledons thick; radicle short, inferior; plumule many-leaved.—Genus 1. Species 3.—Cosmopolitan.

CERATOPHYLLUM Linn.

Characters of the order.

The genus is therapeutically inert.

1. **Ceratophyllum demersum** Linn. Sp. Pl. (1753) 992.—*C. verticillatum* Roxb. Hort. Beng. (1814) 68.

Whole plant 20-90 cm. long, forming a much-branched tangle of slender branches and leaves which collapse in a tassel when taken out of the water. Leaves about 2.5 cm. long; segments spreading in water, variable in thickness and amount of toothing. Male flowers solitary, in separate axils from the female but on the same plant. Perianth (or involucre) of 6-12 narrow 2-fid segments. Stamens 10-30, sessile; anthers large, white. Female flowers: Perianth (or involucre) as in the male, often with an entire acute (not 2-fid) apex. Ovary sessile, 1-celled; style subulate. Fruit very variable.

Distribution: All over India.—Cosmopolitan.

The plant is cooling, oleagenous, bitter, fragrant; laxative, antipyretic; useful in biliousness, "tridosha," diseases of the blood, ulcers (Ayurveda).

Vagbhata recommends the external application of the plant ground to a paste in cases of scorpion-sting; but the plant is useless in the symptomatic treatment of the sting (Caius and Mhaskar).

Arabic: Tuhalaba—; *Bengal:* Sheoyala—; *Canarese:* Haval—;

English: Hornwort—; *Gujerati:* Lila, Shewala—; *Hindi:* Sivara—; *Marathi:* Shevala—; *Persian:* Jamenguka, Javal, Pashamendara—; *Sanskrit:* Ambuchamar, Ambutala, Araka, Hathaparni, Jalaja, Jalakesha, Jalakuntala, Jalanchana, Jalanili, Jalanilika, Jalaprishthaja, Jalashuka, Kavara, Manjula, Salilakundala, Shaiwal, Sheshana, Shivala, Varichamara—; *Tagalog:* Inata—; *Telugu:* Nasu—.

GNETACEAE.

Shrubs, erect or climbing, resin-ducts absent. Leaves opposite, whorled or reduced to a short 2-4-toothed sheath; stipules 0. Flowers unisexual, dioecious, rarely monoecious, in axillary or terminal spikes or cones. Male flowers : Perianth 2-lobed, valvate, or spathaceous; filaments connate in a column; anthers 2-8, globose, 1-3-celled, sessile or subsessile on the column, dehiscing by short apical slits. Female flowers: One erect ovule with one integument prolonged into a tube (tubillus) which has the functions of a style, and enclosed in a single or double perianth. Seed dry or drupe-like; albumen copious or scanty; embryo straight; cotyledons appressed; radicle long, superior.—Genera 3. Species about 45.—Tropics and subtropics.

1. Shrubs, leafless or nearly so .... EPHEDRA.
2. Trees or shrubs with large green leaves .... GNETUM.

Tonic, diaphoretic, antipyretic.

The two alkaloids, ephedrine and pseudo-ephedrine, have been isolated from several species of EPHEDRA.

OFFICIAL :—Ephedrine hydrochloride; *Ephedra spp., E. equisetina* Bunge, *E. sinica* Stapf in Great Britain.

EPHEDRA Linn.

Leaves reduced to sheaths at the nodes of the branches. Male flowers in short bracteate spikes which are whorled or in pairs.

Female flowers in pairs or sometimes 3 or solitary.—Species 25. Warm temperate.

1. Internodes of branchlets 1.3-3.8 cm. long .... 1. *E. gerardiana.*
2. Internodes of branchlets 2.5-5 cm. long .... 2. *E. intermedia.*

Tonic, diaphoretic, antipyretic, depurative.

The following are used medicinally in Europe—*E. gerardiana* Wall.—; in China and Malaya—*E. equisetina* Bunge, *E. gerardiana* Wall., *E. sinica* Stapf—; in the United States of America—*E. nevadensis* S. Wats.—.

Chemically and therapeutically there are four known groups of EPHEDRA containing: 1. chiefly ephedrine—*E. equisetina* Bunge, *E. gerardiana* Wall., *E. sinica* Stapf—; 2. chiefly pseudoephedrine—*E. intermedia* Schrenk.—; 3. some other alkaloid than ephedrine—*E. monosperma* S. G. Gmel.—; 4. no alkaloids—American ephedras—.

In India, the specific alkaloidal contents and their variations have been determined by Chopra, Krishna, and Ghosh (*Ind. Journ. Med. Research;* XIX, July 1931).

OFFICIAL :—Ephedrine hydrochloride in Great Britain.

Ephedra spp., E. equisetina Bunge, *E. sinica* Stapf. in Great Britain as sources of ephedrine.

1. **Ephedra gerardiana** Wall. Cat. (1828) no. 6048.—*E. vulgaris* Hook. f. in Fl. Brit. Ind. V, 640.

A low rigid dense tufted shrub 15 cm. to 1.2 m. high, stem woody, gnarled. Branchlets green, erect or arcuately ascending; internodes 1.3-3.8 cm. long, 1.3-2 mm. diam., striate, smooth or slightly scabrid on the ridges; leaf-sheaths 2 mm. long, 2-toothed. Male spikes ovate, solitary or 2-3 together; flowers 4-8, bracts rotund, obtuse, connate, 1.5-2 mm. long; staminal column exserted, anthers 5-8. Female spikes usually solitary, 1-2-flowered; tubillus exserted, straight. Fruit 7.5-10 mm. long, ovoid, red, sweet, edible.

Distribution: Temperate and alpine Himalaya, 8,000—14,000 ft.—W. and Central Asia, Europe.

A decoction of the stems and roots is a popular remedy for rheumatism and syphilis in Russia, and the juice of the berries is given in affections of the respiratory passages.

In China, the thin leafless branches are considered diaphoretic and antipyretic; the root is used as a mild astringent.

The alcoholic extract is very effective in controlling asthmatic paroxysms and in cases of left heart failure (Chopra).

The tincture is an excellent cardiac stimulant in toxic conditions of the heart produced by such infections as pneumonia, diphtheria, etc. (Vere Hodge).

The physiological action of ephedrine and pseudoephedrine obtained from the Indian varieties of *E. gerardiana* has been determined by Chopra, Dikshit and Venkatachalam Pillai (*Ind. Journ. Medical Research;* XVI, January 1929).

Jaunsar: Tutgantha—; *Kanawar:* Khama, Khanda—; *Ladak:* Trans, Tsapatt, Tse—; *Punjab:* Amsania, Budshur, Chewa—; *Russian:* Kuzmicheva trava—; *Sutlej:* Phok—.

2. **Ephedra intermedia** Schrenk. & Meyer Monogr. Ephed. (1846) 88.—*E. pachyclada* Boiss. Fl. Or. V, 713.

An erect shrub or prostrate below with long lax branchlets. Branchlets glaucous; internodes usually 2.5-5 cm. long, a few 1.3-1.8 cm. or occasionally 5-12.5 cm. long, 1.5-2.5 mm. diam., striate, scabrid on the ridges and rough to the touch when dry; leaf-sheaths 3.8 mm. or a little less, 2-toothed. Male spikes subglobose, numerous, in dense whorls at the nodes; flowers about 8, bracts broadly obovate, obtuse, connate, 1.5-2 mm. long; staminal column shortly exserted, anthers 5-6. Female spikes solitary paired or whorled 2-flowered; tubillus exserted, twisted, long. Fruit 7.5 mm. long, ovoid, red.

Distribution: W. Himalaya up to 15,500 ft., Trans-Indus.—Afghanistan, E. Persia.

The therapeutic properties are the same as those of *E. gerardiana*.

Afghanistan: Gehma, Hum, Huma—; *Kanawar:* Khanna—; *Pushtu:* Oman—.

GNETUM Linn.

Evergreen climbing shrubs or erect trees; branches jointed. Leaves opposite, entire, penninerved. Flowers monoecious or dioecious, whorled, in the axils of the cupular bracts of axillary or

terminal solitary or paniculate spikes, often surrounded by jointed hairs. Male flowers: Perianth narrowly clavate, entire or valvately 2-fid. Stamens adnate to the base of the perianth; filaments connate in a column, exserted from the mouth of the perianth; anther-cells 2, distinct, sessile on the top of the column, opening by terminal slits. Female flowers (some imperfect): Ovule ovoid or globose, the inner integument produced into a slender exserted tube with often a toothed or fimbriate mouth. Seed drupe-like.—Species 15.—Tropics.

G. scandens is used medicinally in Annam. It enters into the composition of Malayan ipohs.

1. **Gnetum scandens** Roxb. Hort. Beng. (1814) 66.—*G. funiculare* B. Sm. Wight Ic. t. 1955.

A lofty dioecious climber with dichotomous branches; bark thick, scaly; young shoots jointed and swollen at the insertion of the leaves. Leaves opposite, 11.5-15 by 5-7.5 cm., ovate-oblong or elliptic, obtusely acuminate, smooth and polished, base obtuse or very shortly cuneate; main nerves 6-8 pairs, slender, with lax reticulate venation between; petioles 6-13 mm. long. Flowers in stiff paniculate spikes (generally one or two opposite pairs of cylindric spikes and a terminal one); bracts of the male flowers closely imbricate, those of the female interrupted. Fruiting spikes 7.5-25 cm. long. Stigma 3-fid. Fruit somewhat olive-shaped, drupaceous, 2.5-3.8 cm. long, of a reddish orange colour when ripe, obtuse at the apex, narrowed at the base into a short stout stalk, the pulp intermixed with many tender spicules.

Distribution: Sikkim, Assam, Khasia, Chittagong, Burma, Andamans, W. Peninsula, Malay Peninsula.—Malay Archipelago, China.

In Annam, the roots and stems are used as an antiperiodic. An infusion of the stems is given for penetrating wounds of the abdomen caused by a horn thrust.

Annam: Cam bao long, Cay gam, Gam huyet—; *Bombay:* Kumbal, Umbli—; *Burma:* Gyutnwe—; *Canarese:* Kodkamballi, Navurukatte—; *Kolami:* Milgandi—; *Malay:* Blaikichi, Blaikichil—;

Malayalam: Ula—; *Saora:* Apajuttili, Kalol, Luliti—; *Tagalog:* Bias, Toval—; *Tongking:* Cay sol—; *Uriya:* Lolori—.

CONIFERAE.

Trees or shrubs, usually resinous, mostly evergreen. Leaves usually needle-like or scale-like, rarely with a broad blade; stipules 0. Flowers monoecious or dioecious, perianth 0. Male flowers in deciduous catkins consisting of stamens which are usually scale-like and bear 2-6, rarely more, 1-celled pollen-sacs on the lower surface. Female flowers in cones, consisting of scale-like open carpels which are flat or peltate and bear either directly or on a special subsidiary scale (placental scale) 1-2-many ovules or the female cone reduced to a single ovuliferous scale or to a single ovule. Fruit usually a woody cone sometimes berry-like or formed from the ovule alone in which case the outer coat usually becomes fleshy. Embryo with 2-16 cotyledons.—Throughout the world, chiefly in cold regions.

A. Scales of the female cone opposite, in several series. Leaves very short or subulate
 1. Scales of cone woody; testa winged .... CUPRESSUS.
 2. Scales of cone cohering into a globose berry-like fruit enclosing the seeds; testa hard not winged .... JUNIPERUS.

B. Scales of female cone or spike few. Leaves scattered or bifarious
 Female cone minute, 1-flowered. Seed seated in a symetric fleshy cup .... TAXUS.

C. Scales of female cone many, spirally arranged in several series
 1. Leaves persistent, in bundles of 2, 3 or 5, narrowly linear. Scales of cone persistent .... PINUS.
 2. Leaves persistent, in bundles of many, acicular, scales of erect cone deciduous .... CEDRUS.
 3. Leaves more or less distichous, linear. Scales of large erect cone deciduous .... ABIES.

The bark and leaves are astringent; the resin and the essential oil are stimulant, diuretic, and anthelmintic.

The glucoside coniferin occurs in the cambium sap of coniferous trees; thujin occurs in THUYA.

A toxic alkaloid, taxine, has been isolated from the leaves, shoots, and fruits of the yew. Other toxic substances obtained from members of this Order are formic acid, oil of savin, oil of yew.

OFFICIAL:—*Abies sibirica* Ledeb. in Great Britain.

Callitris quadrivalvis Vent. (Austria, Denmark, France, Japan).

Cupressus sempervirens Linn.=*C. fastigiata* De Cand. (Portugal).

Dammara australis Don. (France).

Juniperus spp. (Denmark, Japan, Norway); *J. communis* Linn. (Austria, Belgium, Denmark, France, Germany, Holland, Hungary, Italy, Japan, Norway, Portugal, Russia, Sweden, Switzerland, Turkey, United States); *J. oxycedrus* Linn. (Austria, Belgium, Denmark, France, Germany, Great Britain, Holland, Hungary, Italy, Japan, Norway, Russia, Spain, Sweden, Switzerland, Turkey, United States)=*J. rufescens* Link. (Portugal); *J. Sabina* Linn. (Austria, Denmark, France, Hungary, Italy, Norway, Portugal, Sweden, Switzerland).

Larix decidua Mill. (Belgium, Denmark, France, Hungary, Norway, Sweden, Switzerland); *L. europpoea* DC. (Holland, Italy)=*Pinus Larix* Linn. (Portugal, Spain); *L. sibirica* Ledebour (Germany, Turkey).

Picea excelsa Lamk. (France),—Link. (Sweden)=*Abies excelsa* DC. (Italy).

Pinites succinifera Goepp. (Holland).

Pinus spp. (Austria, Belgium, Denmark, Germany, Great Britain, Holland, Hungary, Italy, Japan, Norway, Russia, Spain, Sweden, Switzerland, Turkey, United States); *P. Abies* Linn.= *Abies excelsa* De Cand. (Portugal); *P. australis* Mich. (Hungary, Spain); *P. halepensis* Mill. (Italy); *P. Laricio* Poiret (Austria, Italy, Spain); *P. Laricis* Poiret (Hungary); *P. Larix* Linn.= *Larix europaea* De Cand. (Portugal); *P. maritima* Lam. (Spain),—Brot. & Poir.= *P. Pinaster Solander* (Spain, Portugal); *P. montana* Miller= *P. Pumilio* Haenke (United States),—var. *Pumilio* (Haenke) Willkomm (Switzerland); *P. palustris* Miller (Holland, Switzerland, United States); *P. Picea* Linn.=*Abies pectinata* De Cand. (Portugal);

P. Pinaster Solander (Denmark, France, Hungary, Italy, Sweden),= *P. maritima* Lam. (Spain),=*P. maritima* Poiret (Hungary, Switzerland); *P. Pinea* Linn. (Italy); *P. Pumilio* Haenke (Austria); *P. silvestris* Linn. (Austria, Germany, Russia, Sweden, Turkey); *P. Strobus* Linn. (Italy); *P. succinifera* Goepp. (Portugal); *P. sylvestris* Linn. (France, Hungary, Italy, Spain); *P. Taeda* Linn. (Holland, Spain); *P. Toeda* Linn. (Italy).

Thuya occidentalis Linn.=*Biota Tatarica* Gord. in Portugal

Cupressus Linn.

Evergreen trees, branches whorled or not. Leaves of seedlings and young plants needle-like, in whorls of 3 or 4, spreading; of older plant scale-like, densely covering the shoots, the tips spreading or closely adpressed, opposite in pairs. Flowers monoecious. Male catkins numerous, solitary at the tips of the branchlets, ovoid, small; stamens stipitate, peltate, bearing on their lower edge 2-6 globose pollen-sacs. Female flowers in cones composed of 4-12 decussate, peltate scales, those at the base and apex sterile, the others bearing above the base 2 to many upright ovules. Cone globose, woody, composed of the peltate scales which touch one another at the edges, but do not overlap, taking one or two years to mature. Seeds compressed or angular with lateral wings. Embryo with 2-4 cotyledons. —Species 12.—Mediterranean, Asia, N. America.

The fruit of *C. sempervirens* Linn. (*C. fastigiata* De Cand) is officinal in Portugal.

1. **Cupressus sempervirens** Linn. Sp. Pl. (1753) 1002.—Plate 922A.

A tall tree with a narrow pyramidal crown, stem fluted, bark with shallow vertical fissures, branches ascending not whorled, branchlets deep green very slender. Leaves with closely adpressed tips, so that the branchlets are not rough to the touch. Male catkins 2.5 mm. long. Ripe cones solitary or few together, about 2.5 cm. diam.

Distribution: The tree described is a variety only known in the cultivated state, namely, N.-W. India. The wild form with the spreading branches is a native of Asia Minor, Syria and N. Persia.

The wood and fruit are regarded as astringent and anthelmintic. The fruit is prescribed as an aromatic stimulant in piles.

Dutch: Cypresseboom—; *English:* Cypress—; *French:* Cyprès, Cyprès pyramidal—; *German:* Zipressenbaum—; *Greek:* Kyparissi, Kyparissos—; *Hindi:* Sara, Saras, Saru—; *Italian:* Cipresso—; *Malayalam:* Churam—; *Marathi:* Saruboke—; *North-West Provinces:* Sara, Saras—; *Portuguese:* Cypreste—; *Roumanian:* Chiparos—; *Russian:* Kyparis—; *Sanskrit:* Surahva—; *Sind:* Farash—; *Spanish:* Cipres—; *Swedish:* Cypress—; *Tamil:* Suram—.

JUNIPERUS Linn.

Low evergreen shrubs or trees, aromatic. Leaves often glandular on the back, needle-like in whorls of 3; or scale-like, opposite, in pairs or threes, on young plants and vigorous shoots, subulate, spreading. Flowers monoecious or dioecious. Male catkins small, cylindric, ovoid, axillary or terminal, solitary; stamens decussate or in threes, connective enlarged ovate or peltate at the apex, bearing 2-6 globose pollen-sacs near the base. Female flowers in cones composed of 2-6 opposite or ternate scales, the scale usually not all fertile; ovules 1-2 to each fertile scale, upright. Fruit a berry-like cone, more or less succulent, smooth or marked by the tips of the scales. Seeds 1-12, hard, bony, not winged. Embryo with 2-6 cotyledons.—Species 30.—N. hemisphere.

1. Shrubby, erect or decumbent .... 1. *J. communis.*
2. A glaucous blue prostrate or erect bush or small tree with fastigiate branches .... 2. *J. recurva.*
3. A small tree, attaining 15 m.; branchlets subdistichous .... 3. *J. macropoda.*

The fruit is tonic, sudorific, stomachic, diuretic, emmenagogue, and carminative.

J. communis Linn., *J. oxycedrus* Linn., *J. phoinicaea* Linn., *J. sabina* Linn., are used medicinally in Europe; *J. communis* Linn., *J. virginiana* Linn. in North America.

OFFICIAL : *J. Sabina Linn.* : the young branches in Austria, Denmark, France, Hungary, Italy, Portugal, Sweden, Switzerland; the oil in Norway.

The fruit of *J. communis* Linn. in Belgium, Denmark, France, Germany, Holland, Hungary, Italy, Japan, Norway, Portugal, Russia, Sweden, Switzerland, Turkey, United States of America; the fruit and the wood in Austria.

The oil or pitch from *J. oxycedrus* Linn. in Austria, Belgium, Denmark, France, Germany, Great Britain, Holland, Hungary, Italy, Japan, Norway, Russia, Spain, Switzerland, Turkey, United States; *J. oxycedrus* Linn. (*J. rufescens* Link.) in Portugal; and various species in Denmark, Japan, Norway.

1. **Juniperus communis** Linn. Sp. Pl. (1753) 1040.—PLATE 922B.

A dense shrub more or less procumbent. Leaves 5-13 mm. long, in whorls of 3, linear, sharply pointed, spreading nearly at right-angles from the branchlets, convex on the back, concave and glaucous bluish white on the upper surface, jointed at the base and continued down the stem with a large gland on the decurrent portion. Flowers dioecious, axillary. Fruit 7.5-10 mm. long, subglobose, blue black, glaucous, the tips of the scales visible at the apex. Seeds 1-3.

Distribution: W. Himalaya from Kumaon westwards, 12,500—14,000 ft.—Temperate and subarctic Europe, Asia, N. Africa and N. America.

The plant is bitter, pungent, acrid; heating; appetiser; carminative, anthelmintic, alexipharmic, laxative; useful in diarrhœa, abdominal pains, strangury, diseases of the spleen and abdomen, ascites, tumours, piles, bronchitis, indigestion, constipation, vaginal discharges (Ayurveda).

The plant has a bad odour and a sour, sweet, sharp taste; mild astringent to the bowels, antipyretic, tonic.—The stem is bitter; purgative, alexipharmic, styptic, vulnerary, diuretic, emmenagogue, aphrodisiac, antidiaphoretic, tonic; enriches the blood; useful in stomatitis, bronchitis, chest troubles, liver complaints, piles, labour pains.—The fruit has a bad taste; aphrodisiac, styptic; useful in asthma, stomatitis, hemicrania, chronic bronchitis, diseases of the liver and the spleen; applied in hydrocele, and prolapse of the rectum.—The oil from the fruit is emmenagogue, abortifacient, tonic,

anthelmintic; good for earache, toothache, piles; cooling to the brain (Yunani).

The nuts are sold in the bazars of Northern India for medicine, and are prescribed as diuretic and stimulant. Irvine mentions that they are imported into Patna from Nepal, and are used in the treatment of gonorrhœa.

Juniper fruit and oil possess carminative, stimulant and diuretic properties. They are useful in different forms of dropsies, either administered alone, or in combination with other diuretics. They have been used in mucous discharges as gonorrhœa, gleet and leucorrhœa; and in some cutaneous diseases. The wood has been regarded as sudorific in its action, and has been substituted for Guaiacum and Sassafras.

Arabic: Abhal—; *Bengal:* Havusha—; *Catalan:* Ginebra—; *Chamba:* Betar, Bithal—; *Chitral:* Bhiterrik—; *Deccan:* Abhal—; *Denmark:* Enebaer—; *Dutch:* Geneverboom—; *English:* Juniper—; *French:* Bruta, Cad, Cade, Capelet, Geneure, Genèvre, Geniėvre, Petit cèdre, Petron, Pétrot, Potron, Thériaque des paysans—; *Garhwal:* Jhora—; *German:* Butzelbeere, Dexenbeere, Dexenholz, Duerenbeere, Duerenholz, Einholz, Eneber, Feuerholz, Gronawett, Jachandelstrauch, Hohandelbeere, Kinkelbeere, Kluspersbeere, Knickenbeere, Kniel, Knirk, Krametzbaum, Kranawittstrauch, Kranewittbaum, Kronewittbaum, Krowitt, Machandelbaum, Macholder, Raekholder, Reckholder, Reihbaum, Tachandel, Wachandel, Wachholder, Wachtelbaum, Wachtelbusch, Weckelder, Wegbaum, Wegholder, Weheldorn—; *Greek:* Arkevthos—; *Hindi:* Aaraar, Haubera—; *Hungarian:* Boroka—; *Italian:* Genebro, Ginepro—; *Kanawar:* Langshur, Lewar, Pama, Tailu, Thelu—; *Kashmir:* Bentha, Betar, Nuch, Pama, Pethra—; *Kumaon:* Chichia—; *Lahoul:* Sbama; *Languedoc:* Genebre, Jenouérat, Jenouerè—; *Marathi:* Hosha—; *Norwegian:* Enebaer—; *Piti:* Chuni, Shuha—; *Portuguese:* Zimbro—; *Punjab:* Betar, Betthal, Chueh, Chui, Dhup, Giashuk, Gugil, Langshur, Lassar, Lewar, Nuch, Pama, Petthar, Petthri, Shupa, Thelu, Wetyar—; *Roumanian:* Ienupere—; *Russian:* Pojjevelnik—; *Sanskrit:* Aparajita, Ashvathaphala, Dhmankshanashini, Habusha, Hapusha, Kachhughna, Kaphaghni, Matsyagandha, Plihahantri,

Plihashatru, Svalpaphala, Vapusha, Vigandhika, Vishaghni, Visra, Visraganga—; *Spanish:* Enebro—; *Swedish:* En, Enebaerstraed, Enbuske—; *Turkish:* Ardic—; *Urdu:* Abahal, Saru—.

2. **Juniperus recurva** Ham. in D. Don. Prodr. Fl. Nep. (1825) 55.—Plate 923.

A procumbent shrub. Leaves 2.5-5 mm. long, in whorls of 3, lanceolate, sharply pointed, ascending, loosely imbricated, somewhat incurved, back convex, upper surface concave, base not jointed, decurrent with a large gland on the decurrent portion which is often produced along the back of the free portion, looking like a midrib in dry specimens. Flowers dioecious, terminal or terminating short lateral branchlets. Fruits 7.5-10 mm. long, ovoid, dark brown or blackish purple, shining when ripe. Seed one.

Distribution: Temperate and alpine Himalaya 7,500—15,000 ft.—Afghanistan.

The smoke from the green wood is known in Kashmir as a powerful emetic, producing long-continued vomiting (Aitchison).

English: Weeping Blue Juniper—; *Kaghan:* Bhentia—; *Lepcha:* Chukboo—; *Nepal:* Tupi—; *North-West Provinces:* Agani, Bhedara, Bettir, Bidelganj, Bil, Guggal, Jhora, Phulu, Thelu, Urun—; *Punjab:* Bettar, Chuch, Phulu, Thelu, Wetyar—; *Sikkim:* Chakbu, Deschu—; *Tibet:* Pama—.

3. **Juniperus macropoda** Boiss. Fl. Or. V (1881) 709.—Plate 924.

A small or medium sized tree; bark reddish brown, fibrous, vertically fissured, exfoliating in fibrous strips. Leaves of two kinds; on young seedlings and some of the lower branches subulate, pungent; on most branches scale-like, closely adpressed, with a large oblong or elliptic gland in the centre of the back. Flowers monoecious, the male at the tips of the branchlets, the female terminating short side branchlets. Fruit 7.5 mm. diam. globose, blue black, very resinous, the tips of the scales forming transverse ridges. Seeds 2-5.

Distribution: Himalaya from Nepal westwards up to 14,000 ft., Baluchistan.—Afghanistan, Persia. Arabia.

The fruit is used medicinally, and appears to have similar properties to that of *J. communis.* The smaller branches, when burnt,

are supposed to exercise a deodorising and cleansing influence, and, in Khagan, they are believed to act as a remedy for the delirium of fever.

Baluchistan: Apurs, Ghushki, Ubashta—; *Chitral:* Sarus—; *English:* Himalayan Pencil Cedar—; *Garhwal:* Dhup, Padmak, Padmar—; *Hazara:* Charai—; *Kanawar:* Shur—; *Kumaon:* Chundun, Dhup, Dupri, Lewar, Newar, Surgi—; *Lahoul:* Shur—; *Nepal:* Chandan, Dhupi, Dhupri, Shukpa—; *North-West Provinces:* Dhup, Padam, Padmak, Surgi—; *Punjab:* Chalai, Lewar, Luir, Shukpa, Shur, Shurgu—; *Pushtu:* Obusht—; *Sutlej:* Shur—; *Tibet:* Shukpa, Shurbuta, Shurgu—; *United Provinces:* Dhup—; *Upper Chenab:* Shur—.

Taxus Linn.

Species 1.—N. temperate zone.

T. baccata Linn. is used medicinally in England and other European countries.

1. **Taxus baccata** Linn. Sp. Pl. (1753) 1040.—Plate 925A.

A small or medium sized evergreen tree, stem fluted; branches horizontal, wide-spreading, not whorled. Leaves 2.5-3.8 cm. long, linear, flattened, distichous, acute, narrowed into a short petiole which is decurrent along the twig, dark green and shining above, pale yellowish brown or rusty red below. Flowers usually dioecious. Male flowers in catkins which are subglobose and solitary in the leaf-axils; stamens about 10, pollen-sacs 5-9, globose, arranged around the filament beneath the peltate tip of the stamen. Female flowers solitary, axillary, resembling leaf-buds, each consisting of a few imbricate scales round a single erect ovule, which is surrounded at the base by a membranous cup-shaped disk. In fruit the disk enlarges, becomes succulent and bright red, about 7.5 mm. long, and surrounds the olive green seed of which only the tip is exposed. Testa woody; embryo with 6-7 cotyledons.

Distribution: Temperate Himalaya 6,000—11,000 ft., Khasia Hills, Upper Burma.—N. and temperate E. Asia, all Europe, N. Africa, N. America.

Yew leaves and fruits have been given for their emmenagogue, sedative and anti-spasmodic effects.

In Bombay, the dried leaves (talispatra) are used in asthma, bronchitis and hiccough.

In Northern India, the leaves are largely employed for medicinal purposes, under the name of *birm* or *brahmi,* chiefly as a remedy for indigestion and epilepsy and as an aphrodisiac.

The bark is used by Kunawaris as a substitute for tea.

In England, a medicinal tincture is made from the young shoots which has distinct and curative uses in headache with giddiness, feeble faltering pulse, coldness of the extremities, diarrhœa, general prostration, and severe biliousness. A jelly prepared from the berries is given for chronic bronchitis. The leaves are used for epilepsy.

In some parts of Germany, a decoction of the wood is a well-known remedy against hydrophobia.

Therapeutically the yew appears to hold an intermediate position between savin and digitalis, being allied to the former by its acrid, diuretic and emmenagogue properties, and to the latter by the giddiness, irregular and depressed action of the heart, convulsions and insensibility, which it produces. Yew is, however, reported to have one decided advantage over digitalis by its effects not accumulating in the system, so that it is a much more manageable remedy than digitalis. Besides, its use as an emmenagogue and sedative in the same cases as savin and digitalis are administered, it has also been employed as a lithic in calculus complaints; and as an anti-spasmodic in epilepsy and convulsions (Pereira).

The leaf is prescribed in the treatment of snake-bite (Sushruta, Vagbhata) and scorpion-sting (Sushruta); but it is not an antidote to either snake-venom (Mhaskar and Caius) or scorpion-venom (Caius and Mhaskar).

Ajmere: Bhirmi, Sugan—; *Bashahr:* Arkhau—; *Bengal:* Bhirmie, Burmie, Sugandh—; *Bhutia:* Tingschi, Tsashing—; *Bombay:* Barmi—; *Catalan:* Teix—; *Chamba:* Barini, Barma, Birmi, Chatung, Chogu, Pastal, Sungal, Thunu, Tung—; *Danish:* Barlind, Taextraee—; *Dutch:* Ibenboom, Taxisboom—; *English:* Yew—; *French:* If, If ă baies, If commun, If d'Europe, If reteau, If veteau—;

German: Eibe, Ibe, If, Kantelbaum, Roteibe, Taxbaum, Taxus, Ybe—; *Greek:* Smilakia—; *Hindi:* Birmi, Thuno, Zirnubbirmi—; *Irish:* Iubhar—; *Italian:* Albero de la morte, Libo, Nasso, Tasso—; *Jaunsar:* Thuner, Thuniara—; *Kanawar:* Yamdal—; *Kashmir:* Barini, Barma, Birmi, Chatung, Chogu, Postal, Postil, Thunu, Sungal, Tung—; *Khasia:* Dingsableh—; *Kumaon:* Brahmi, Gallu, Geli, Luet, Lust, Nare, Thaner, Thuner—; *Ladak:* Pungcha, Pungchu Sungcha—; *Lepcha:* Cheongbu—; *Nepal:* Dhengresalla, Tcheiraygulab, Tcheiraysulah—; *North-West Provinces:* Gallu, Geli, Lust, Thuner—; *Portuguese:* Teixo—; *Punjab:* Barma, Barmi, Birmi, Chogu, Dhunu, Kadenru, Kautu, Nyamdal, Rakhal, Rikaling, Rikhai, Thona, Thunu, Tung—; *Pushtu:* Badar, Kharoa, Sarap, Sarop—; *Roumanian:* Tisa—; *Russian:* Tis—; *Spanish:* Tejo—; *Swedish:* Barrlinc, Id—; *Tibet:* Nhare—; *Western Himalaya:* Barma, Barmi, Thuner, Thunu—.

Pinus Linn.

Evergreen trees, the branches whorled. Shoots dimorphic, long-shoots and dwarf-shoots. Leaves dimorphic, those of seedlings and long-shoots single, needle-like or reduced to scales, those of the dwarf-shoots arranged in a bundle of 2, 3 or 5 on the shoots, their bases and the dwarf-shoots surrounded by scales (bud-scales), dwarf-shoots shed with their leaves. Flowers monoecious. Male catkins borne on the shoots of the current year, in whorls crowded at the base of the shoot, yellow, rarely purple. Stamens numerous, each bearing 2 pollen-sacs, the connective produced in a membranous tip. Female flowers in cones which are solitary or whorled, sometimes remaining at the tips of the shoots, at other times the shoot grows on and leaves the flowers at some distance below the tip; scales double the lower (carpellary scale) small disappearing in fruit, the upper (placental scale) bearing near its base 2 reversed ovules and becoming hard and woody in fruit. Cone formed from the imbricating woody or almost leathery placental scales. Seed usually with, rarely without a wing; cotyledons 4-15.—Species 70.—N. temperate and on mountains in the Northern tropics.

A. Leaves in clusters of 3
  1. Leaves 23-30 cm. .... 1. *P. longifolia.*
  2. Leaves 7.5-12.5 cm. .... 2. *P. gerardiana.*
B. Leaves in clusters of 5-8 .... 3. *P. excelsa.*

The buds, the knots of the roots and branches, and the resin are used medicinally for their diuretic, antiscorbutic, antirheumatismal, and vulnerary properties.

The following species are known to be used in Europe—*P. cemora* Linn., *P. laricio* Poir., *P. pinea* Linn., *P. pumilio* Haenhe, *P. sylvestris* Linn.—; in China and Japan—*P. massoniana* D. Don ex Lamb., *P. sinensis* Lam.—; in China—*P. koraiensis* Sieb. & Zucc., *P. sinensis* Benth.—; in Malaya: *P. sinensis* Lam.—; in North America—*P. lambertuaba* Dougl., *P. palustris* Mill.—.

OFFICIAL: The leaves of *P. silvestris* Linn. in Russia.

The fruits, milky juice and sap of *P. maritima* Brot. & Poir. (*P. Pinaster* Solander) in Portugal.

The oil from *Pinus spp.* (Belgium, Denmark, Germany, Great Britain, Holland, Hungary, Japan, Norway, Russia, Spain, Sweden, Switzerland, Turkey, United States); *P. Abies* Linn.=*Abies excelsa* De Cand. (Portugal); *P. Larix* Linn.=*Larix europoea* De Cand. (Portugal); *P. montana* Miller var. *Pumilio* (Haenke) Willkomm (Switzerland), *P. montana* Miller=*P. Pumilio* Haenke (United States); *P. palustris* Miller (Holland, Switzerland, United States); *P. Picea* Linn.=*Abies pectinata* De Cand. (Portugal); *P. pinaster* Sol. (France, Hungary, Sweden),=*P. maritima* Lam. (Spain),—*P maritima* Poiret (Hungary, Switzerland); *P. silvestris* Linn. (Germany, Sweden, Turkey); *P. sylvestris* Linn. (France, Hungary, Italy, Spain); *P. Pumilio* Haenke (Austria).

The resin or oleoresin from *Pinus spp.* (Austria, Italy); *P. australis* Mich. (Hungary, Spain); *P. halepensis* Mill. (Italy); *P. Laricio* Poiret (Austria, Italy, Spain); *P. laricis* Poiret (Hungary); *P. pinaster* Solander (Denmark, Italy); *P. Pinea* Linn. (Italy); *P. silvestris* Linn. (Austria); *P. Strobus* Linn. (Italy); *P. succinifera* Goepp. (Portugal); *P. sylvestris* Linn. (Hungary, Italy, Spain); *P. Taeda* Linn. (Spain); *P. Toeda* Linn. (Italy).

The oleoresin or pitch from *P. maritima* Lam. in Spain.

1. **Pinus longifolia** Roxb. Fl. Ind. III (1832) 651.—PLATE 926A.

A large tree, bark 2.5-5 cm. thick, cut by deep fissures into irregular plates; branches whorled. Leaves in bundles of 3, 23-30 cm. long, bright green, each bundle surrounded at the base by a persistent sheath of bud-scales 1.3-2.5 cm. long. Male catkins 13 mm. long. Female cones on short stiff stalks, solitary or 2-5 together. Ripe cones 10-20 cm. long, 7.5-12.5 cm. diam., scales very thick and woody with a pyramidal pointed or recurved beak. Seed 7.5 mm. long with a long thin membranous wing. Cotyledons 10-14.

Distribution: Outer Himalayan Ranges from the Indus to Bhutan, 1,500—7,500 ft.—Afghanistan.

The plant is sweet, bitter, pungent; heating; oleagenous; intestinal antiseptic; useful in diseases of the eye, the ear, the throat, the blood, and the skin; good in bronchitis, diaphoresis, giddiness, ulcers, inflammations, itching.—The gum is bitter, acrid; heating, oleagenous; purgative, carminative, aphrodisiac, fattening, diuretic, anthelmintic, analgesic; causes biliousness; useful in diseases of the vagina and uterus, the head and the eye; good in dyspepsia, ulcers, diaphoresis, scabies, fetid odour of the body, inflammation (Ayurveda).

The gum has a bad smell and taste; diuretic, emmenagogue, purgative, expectorant; useful in inflammations, asthma, chronic bronchitis, ozoena, piles, diseases of the liver and spleen, gleet, urinary discharges, earache, toothache, lumbago, tuberculous glands, scabies, epilepsy.—The oil lessens inflammation (Yunani).

Internally, the resin is used as a stomachic and externally as a plaster, and is applied to buboes and abscesses for suppuration. The wood is considered stimulant, diaphoretic and useful in burning of the body, cough, fainting and ulcerations.

The resin is stimulant both externally and internally. Internally, it acts chiefly on the mucous membrane of the genito-urinary organs. and is, therefore, a very good remedy for gonorrhœa. I have used it with success in many cases of this disease, and in a few, with decided benefit, after the failure of copaiba, cubebs, gurjan balsam and turpentine. Dose: from one to three drachms in emulsion with

mucilage, four times in 24 hours. As it is very thick, it requires to be mixed well and gradually with the mucilage (Moodeen Sheriff).

Oil of terpentine cannot be recommended as an anthelmintic (Caius and Mhaskar).

The wood and the oleoresin have been recommended for the treatment of snake-bite (Sushruta, Vagbhata, Rasaratnakara) and scorpion-sting (Sushruta, Rasaratnakara, Vaidyavinoda); but they are not an antidote to either snake-venom (Mhaskar and Caius) or scorpion-venom (Caius and Mhaskar).

Parameswaran Pillai and Simonsen have determined the constituents of Indian Turpentine from this tree (*Journ. Ind. Inst. Sc.*; XI (A) 1928).

Almora: Salla—; *Bashahr:* Shti—; *Bengal:* Saralagachha, Saralakashtha—; *Bhutia:* Teadong—; *Canarese:* Barhi, Sarala-devadaru, Iailaparni—; *English:* Long-leaved Pine, Three-leaved Pine—; *Garhwal:* Kolain, Kulhain, Salla, Sarol, Sirli—; *Gujerati:* Saraladeodara—; *Hindi:* Chil, Chir, Dhupasarala, Salla, Saral—; *Jaunsar:* Kulhain, Sarol, Sirli—; *Kashmir:* Salla, Sarl—; *Kumaon:* Chir—; *Lepcha:* Gniet, Nyit—; *Malayalam:* Charalam, Pitadaru, Putikashtam, Saralam, Srivasam—; *Marathi:* Saraladeodara—; *Nepal:* Dhup, Sala, Sula—; *North-West Provinces:* Chir, Kolain, Kolan, Kolon, Salla, Sapin—; *Oudh:* Dhup—; *Punjab:* Anander, Chil, Chir, Drabchir, Gula, Nakhtar, Nashtar, Ransuru, Saral, Thansa—; *Pushtu:* Nakhtar, Nashtar—; *Sutlej:* Shti—; *Sanskrit:* Bhadradaru, Dhupavrikshaka, Manojna, Marichapatraka, Pitadaru, Pitadru, Putikashtha, Sarala, Snigdhadarusanjnaka, Surabhidaruka—; *Tamil:* Simaidevadari, Suruldevadari—; *Telugu:* Devadaru, Sarala—; *Uriya:* Sorolokatho—.

2. **Pinus gerardiana** Wall. in Lamb. Pin. ed. 3, III (1837) t. 79.—PLATE 925B.

A medium sized tree, branches not or obscurely whorled; bark grey, thin, smooth, peeling off in large thin flakes, roughish on old trees near the base. Leaves in bundles of 3, 5-10 cm. long, stiffish, dark green, serrulate, sheath of bud-scales deciduous. Male catkins 7.5-13 mm. long. Female cones near the middle of the shoots. Ripe

cones 15-23 by 10-12.5 cm., scales very thick and woody with a stout recurved beak. Seed 2.5 cm. long, cylindric with a short caducous wing. Cotyledons 3-8.

Distribution: N.-W. Himalaya 5,800—12,000 ft., Baluchistan.—Afghanistan.

All parts are hot, pungent, acrid; appetiser; expectorant; useful in biliousness and fatigue (Ayurveda).

The nuts have flavour; tonic, carminative, aphrodisiac; appetiser; useful in weakness of the limbs, paralysis, deafness, pains in the joints, ophthalmia, liver troubles, chronic bronchitis, griping (Yunani).

The seeds are considered anodyne and stimulant. The oil extracted from them is highly esteemed for its stimulating and healing powers when applied as a dressing to wounds, ulcers, etc. It is also employed as an external application in diseases of the head.

A chemical study of the seed and its oil was undertaken by Hardikar (*Journ. Ind. Chem. Soc.;* V, 1928).

Afghanistan: Chil, Chir, Kashti, Zanghoza, Zanghozeh—; *Arabic:* Habulsaverakabar—; *Baluchistan:* Chalghoza, Zhanghoza—; *Chamba:* Mirri—; *Chitral:* Chujin—; *Hindi:* Gunober, Neur, Rhi—; *Kanawar:* Rhi, Ri, Shangti—; *Kumaon:* Rolecha, Ronecha—; *Pangi:* Miri—; *Persian:* Chilgozah, Sus—; *Punjab:* Chiri, Galboja, Galgoja, Kashti, Mirri, Neoza, Neur, Prita, Rhi, Ri, Roniunchi, Ruminche, Shangti—; *Sanskrit:* Bhutamari, Chida, Darugandha, Gandhamadani, Gandhavadhu, Grahajita, Kapatini, Mangalya, Tara, Taruni—; *Tibet:* Kaninchi, Kannuchi, Koniunchi, Shangti—; *Urdu:* Chilgozah—.

3. **Pinus excelsa** Wall. Pl. As. Rar. III (1832) t. 201.

A tall tree, bark smooth slate-coloured on young, rough with shallow fissures on old trees. Leaves in bundles of 5, 10-20 cm. long, bluish or greyish green, slender, drooping, sheath of bud-scales deciduous. Male catkins 7.5 mm. long. Female cones at the ends of the shoots, usually 2-3 together. Ripe cones 15-30 cm. long, cylindric, scales only slightly woody with obtuse tips. Seeds 7.5 mm. long, wing three times the length of the seed. Cotyledons 8-12.

Distribution: Temperate Himalaya 6,000—12,500 ft. (not in Central and N.-W. Kumaon, nor in Sikkim), Waziristan.—Afghanistan.

The properties are the same as those of *P. longifolia.*

Almora: Dhurasalla—; *Bhutan:* Lamshing, Tongschi—; *Chitral:* Chiwich—; *English:* Five-leaved Pine, Indian Blue Pine—; *Garhwal:* Chilla, Safedchiulu—; *Hazara:* Beyar, Biar—; *Hindi:* Kail—; *Jaunsar:* Chil—; *Jumna:* Chil—; *Kanawar:* Lim—; *Kashmir:* Beyar, Biar, Chil, Kaiar, Tser, Yara, Yari, Yiro, Yur—; *Kumaon:* Byans, Dolchilla, Lamshing, Raisalla—; *Lepcha:* Neetkung—; *Nepal:* Dhupi—; *North-West Provinces:* Chil, Chila, Chilu, Chir, Kail, Karchilla, Lim—; *Punjab:* Andal, Biar, Chil, Chir, Chiti, Darchil, Darchir, Kachir, Kaiar, Kail, Keiiri, Lim, Lhim, Lhimtser, Palsam, Partal, Sam, Shim, Somshing, Tser, Yari, Yero—; *Pushtu:* Limanza, Piuni—.

CEDRUS Mill.

Large trees, evergreen. Leaves triquetrous, in dense clusters, acicular, jointed near the base. Cone of Pinus, but scales deciduous, leaving a columnar axis.—Species 3.—Atlas Mts., Asia Minor, Cyprus, India.

Diaphoretic, diuretic, and antipyretic.

1. **Cedrus deodara** Loudon Arb. Brit. IV, 2428, f. 2283-2286 (1838).—PLATE 928B.

A large evergreen tree; branches not whorled, the leading shoot and tips of the branches usually drooping; bark dark, sometimes almost black, usually very rough on old stems, sometimes only slightly furrowed. Shoots dimorphic, long-shoots with the needles solitary and arranged spirally, and dwarf-shoots with the needles arranged in dense whorls. Leaves 2.5-3.8 cm. long, needle-like, triquetrous, sharp-pointed. Flowers usually monoecious, but some trees or branches habitually bear flowers of one sex. Male catkins solitary at the ends of the branchlets, cylindric, 4.3 cm. long; stamen with 2 oblong polen-sacs, the connective produced as a flattened, ovate, obtuse, upturned appendage with an irregularly crenulate margin. Female flowers in cones which are solitary at the ends of the branchlets; scales double, the placental scale large, the carpellary small, the placental scale bearing near the base 2 reversed ovules. Cone

erect, 10-12.5 by 7.5-10 cm., formed of the imbricating, thin, woody, placental scales which break away when ripe leaving a stout woody axis. Seed 7.5-15 mm. long, pale brown, wing longer than the seed.

Distribution: Trans-Indus, N.-W. Himalaya, eastwards to Kumaon, 3,500—12,000 ft. —Afghanistan.

All parts are bitter, hot, pungent; light, oleagenous; useful in belching inflammations, dyspepsia, insomnia, hiccough, fever, urinary discharges, ozœna, bronchitis, itching, elephantiasis, tuberculous glands, leucoderma, ophthalmia, piles, disorders of the mind, diseases of the skin and of the blood (Ayurveda).

The leaves lessen inflammation; applied in tuberculous glands. —The wood is bitter; diuretic, carminative, expectorant; useful in rheumatism, piles, palsy, epilepsy, stones in the kidney and bladder, prolapsus recti.—The oil is analgestic and alexipharmic; useful for bruises and injuries to joints, boils, tubercular glands, skin diseases (Yunani).

The wood yields a coarse, very fluid kind of turpentine held in much esteem as an application to ulcers and skin diseases. It appears also to enter largely into the preparations for the treatment of leprosy.

The oil acts as a diaphoretic. It is used for skin diseases.

The wood is bitter, useful in fever, costiveness, piles and pulmonary complaints. In Kangra, the wood is pounded with water on a stone, and the paste applied to temples to relieve headache.

It is considered to possess diaphoretic, diuretic and carminative properties and to be useful in fevers, flatulence and urinary disorders. A decoction of this drug was administered to cases of chronic fevers and the result was unsatisfactory (Koman).

The wood is useless in the antidotal treatment of snake-bite (Mhaskar and Caius) and scorpion-sting (Caius and Mhaskar).

Afghanistan: Imanza, Nakhtar—; *Arabic:* Sanobarulhind, Shajratuddevadar—; *Bengal:* Debdaru, Devadaru, Devdar—; *Canarese:* Bhadradaru, Devadara, Devadari, Devadaru, Gunduguragi, Pitadaru—; *Chitral:* Rogh—; *Deccan:* Devdaru—; *English:* Deodar, Himalayan Cedar—; *French:* Déodar—; *Garhwal:* Dadar, Deodar, Deowar, Dewdar, Diar—; *Gujerati:* Devdar, Vanseodeodar—;

Hazara: Dadar, Deodar, Deowar, Dewdar, Diar, Paludar—; *Himalayas:* Kelu, Keoli, Kilar, Kilei—; *Hindi:* Dedwar, Deodar, Deyar, Kilan, Kilankaper—; *Jaunsar:* Kelong—; *Kanawar:* Kelmang—; *Kashmir:* Dadar, Dar, Deodar, Deowar, Dewdar, Diar—; *Kumaon:* Dadar, Deodar, Deowar, Dewdar, Diar—; *Malayalam:* Devataram—; *Marathi:* Devadaru, Dewadar—; *North-Western Himalaya*: Diar, Kelu—; *Persian:* Darakhtedevdar, Deodar, Nashtar, Sanobarehindi—; *Punjab:* Dada, Dewdar, Geyar, Kairval, Kalain, Kalon, Kelai, Keli, Kelmang, Kelu, Keolikelmang, Keori, Palurr—; *Sanskrit* Amaradaru, Bhadradaru, Bhadravata, Bhavadaru, Bhutahari, Daru, Darubhadra, Daruka, Deodaru, Devakashtha, Drukilima, Indravriksha, Kalpapadapa, Kilima, Mastadaru, Paribhadraka, Pitadaru, Pittadru, Putikashtha, Shakradruma, Shambhava, Shatapadapa, Shivadaru, Snighdhadaru, Suradaru, Suradruma, Surakashtha, Suravhaya, Surbhuruha, Svehavriksha—; *Tamil:* Tevadaram, Tevadari, Tevadaru, Vandugolli—; *Telugu:* Devadari, Devadaruvu—; *Tibet:* Giam—; *Urdu:* Deodara—.

ABIES Linn.

Tall evergreen trees. Leaves more or less distichous, needle-like, usually flattened. Cones erect, scales thin, breaking away from a persistent woody axis when ripe, the carpellary scales smaller than the placental but occasionally longer and projecting between them; placental scales bearing at the base, 2 reversed ovules.—Species 24. —N. temperate.

A. balsamea Mill, and *A. pectinata* DC. are used medicinally in Europe.

The oil from *A. sibirica* Ledeb. is officinal in Great Britain.

1. **Abies webbiana** Lindl. in Penny Cyclop. I (1833) 30.—PLATE 928C.

A tree usually stunted and gnarled. Leaves 1.3-2.5 cm. long, spreading in all directions and densely covering the twigs when viewed from above, more or less distichous when the twigs are seen from below, young shoots clothed with short brown hairs.

Distribution: Temperate and subalpine Himalaya.—Afghanistan.

The dried leaves (*talispatra* of Northern India) are regarded as carminative, expectorant, stomachic, tonic and astringent, and useful in phthisis, asthma, bronchitis and catarrh of the bladder. The powdered leaves are often given along with the juice of *Adhatoda Vasica* and honey.

The juice of the fresh leaves is used as a family medicine in fevers, acting as an anti-periodic. It is also prescribed in affections of the chest and during dentition.

The people in Berar use an infusion in the treatment of hoarseness.

Hakims affirm that the gum, mixed with oil of roses, when taken internally, produces intoxication. This mixture is used externally for headache, neuralgia, etc.

Almora: Raisol—; *Bhajji:* Buldu, Burra, Burul—; *Bhutia:* Dumshing, Dunshing—; *Byans:* Wuman, Wumbusing—; *Chamba:* Dhunu, Pe, Rag, Rail, Re, Salle, Sara—; *Chor:* Chilrow, Kilaunta, Raho, Row—; *English:* Himalayan Silver Fir—; *Hattu:* Burla, Pindrai, Pindrau—; *Garhwal:* Bang, Childi, Chiliragha, Chilla, Chilrau, Dodhmaragha, Dodimma, Jhilla, Morunda, Ransula, Teligaragha—; *Jaunsar:* Morinda—; *Jhelum:* Paludar, Rewari—; *Kanawar:* Kalrei, Krok, Pun, Spun—; *Kashmir:* Badar, Budar, Tung—; *Kosi River:* Raisalla, Raunsla—; *Kotkai:* Chur, Kalrai, Satrai—; *Kulu:* Tos—; *Kumaon:* Ragha, Raisalla, Ransla, Raoragha—; *Matiyana:* Kudrom—; *Nepal:* Gobresalla, Gobriasulah—; *Shale:* Bharda, Thanera—.
